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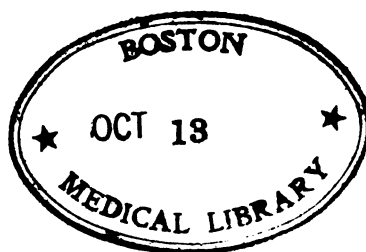
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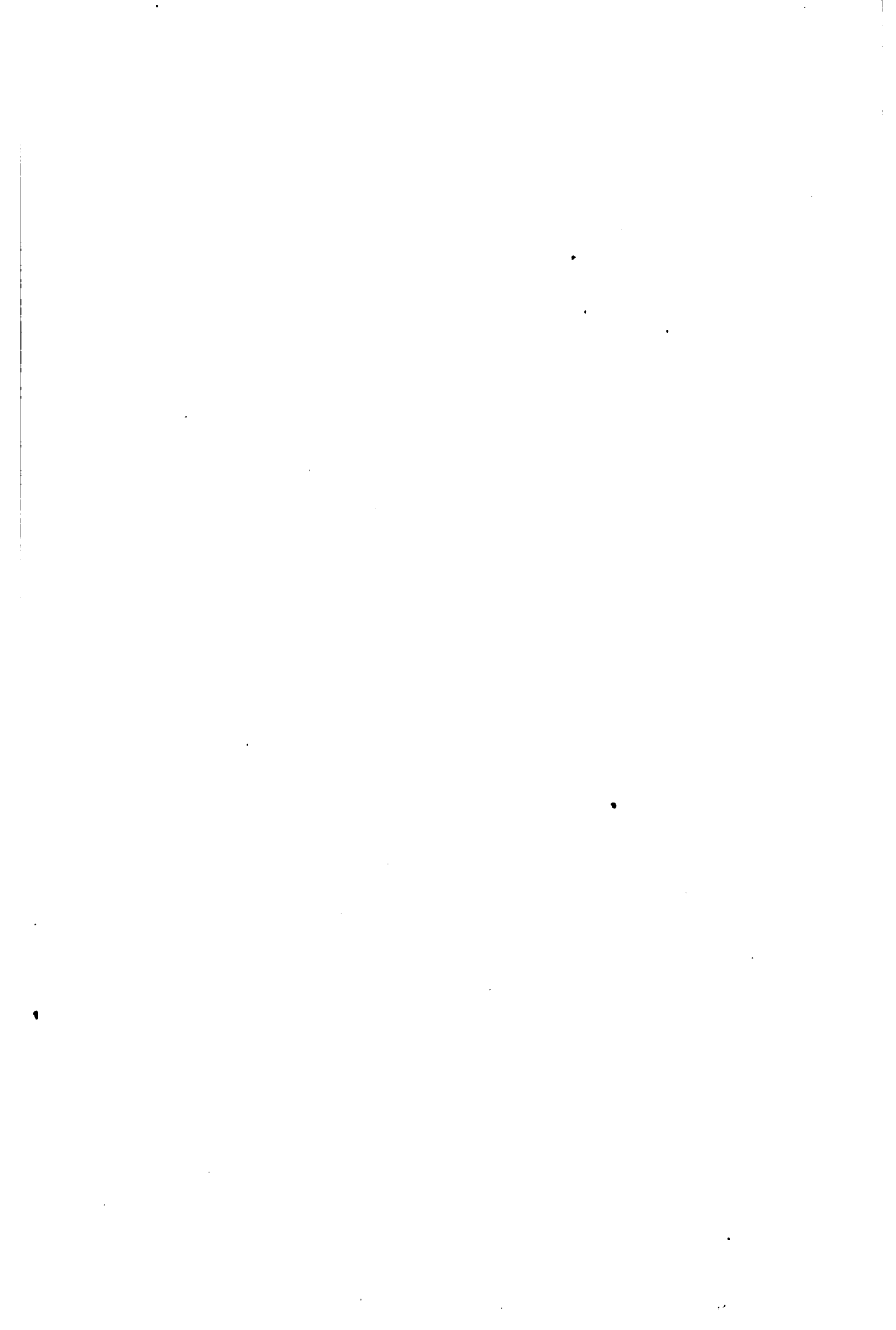
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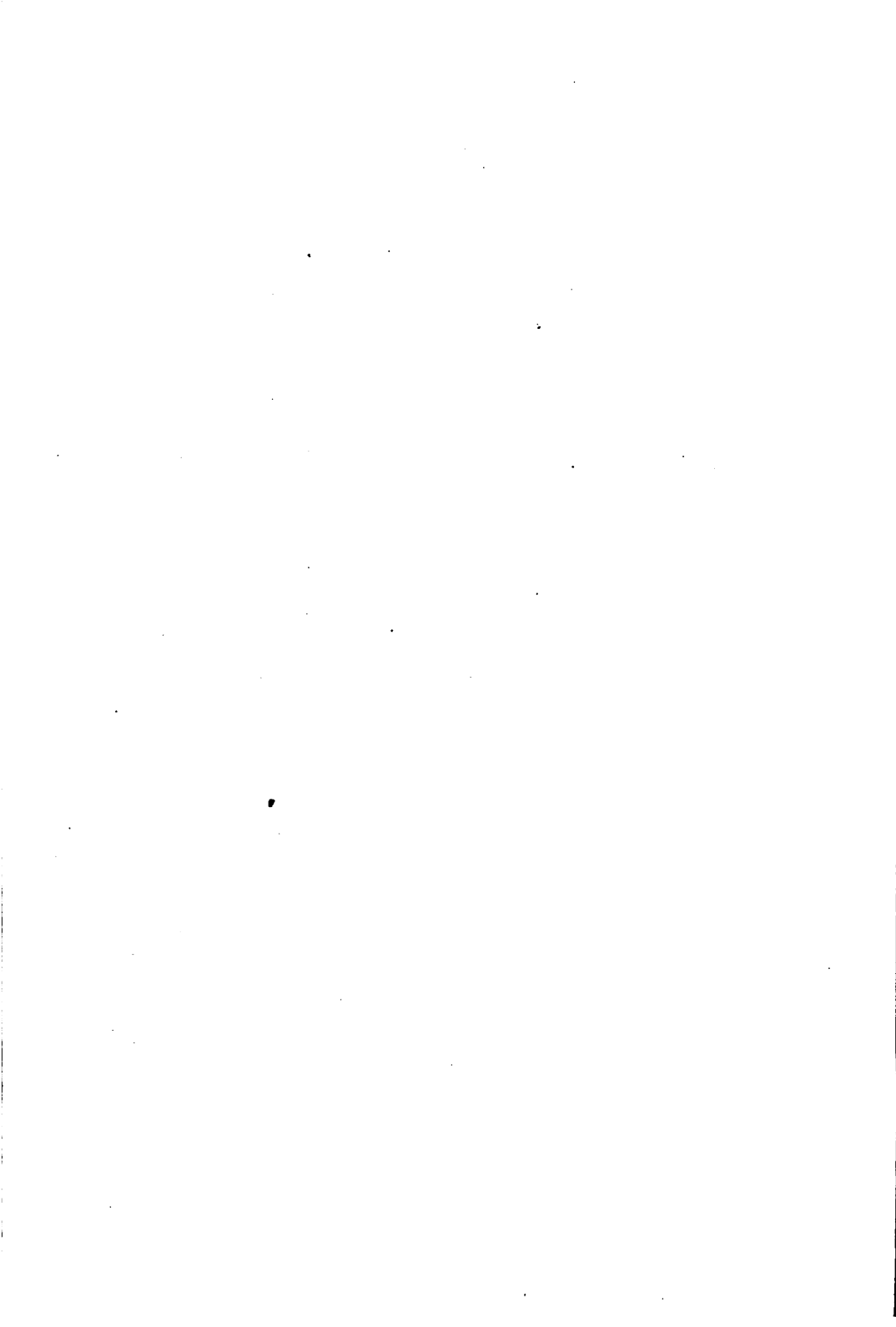


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Augusta Lord Heinsteine
270 Bowdoin St.
Worcester Mass.

1910

The Gymnastic Apparatus in the Gymnastic Orthopedic Institute, Stockholm



a, b, c, high plinth; d, low plinth; e, boom; f, trapeze; g, rib-stool; h, peg-post; i, poles; k, table; l, stools; m, foot-stool; n, forward-drawing-rope; o, rode; p, cushion. Description see page 5.

Hand-Book OF Medical and Orthopedic Gymnastics

By PROFESSOR ANDERS WIDE, M.D.

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Carolean Medico-Surgical Institute and Director
of the Gymnastic Orthopedic Institute,
Stockholm*

With a Frontispiece, and
94 illustrations in the text

Fourth Revised Edition in English



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The 1st Swedish edition was published in 1896

Two German editions were issued in 1897

A French edition appeared in 1898

The 1st English edition was published in 1899

The 2d Swedish edition was published in 1902

The 2d English edition was published in 1902

*The right of translation into Italian and Russian
has been transferred*

This book has been adopted as a text-book at most of the Colleges for Physical Training and Medical Gymnastics in England and America.

PREFACE TO THE THIRD EDITION IN ENGLISH

It is the author's pleasant task gratefully to acknowledge that the first Swedish edition (1896) of his "Handbook of Medical Gymnastics" has met with greater success and attained a wider circulation than he had dared to anticipate.

That a large edition of a work treating such a special subject should be exhausted in Sweden within so short a period as only six years, shows, however, that not only gymnasts, but medical men also have studied the book. The second Swedish edition has had a rapid sale in Sweden, and, moreover, has obtained a somewhat extensive circulation in Norway, Denmark, and Finland.

A new edition of the handbook has also been issued in German and French.

The first English edition was published in London, 1899, the second in New York and London, 1902, and a third is now required in New York and London, which demonstrates the pleasing fact that Medical Gymnastics according to P. H. Ling's system has obtained acknowledgment and increasing adoption in England and America. The present new edition has undergone a thorough revision. There are included, in addition, references to the descriptions of corresponding movements in Zander's treatise on "medico-mechanical," or Zander's, Gymnastics. In connection therewith ought also to be mentioned that in several cases the correspondence between the movements is only approximate. Especially are the starting positions for the gymnastic movements, taken in a proper sense, very often different. [Concerning the "gymnastic manipulations," as is natural to suppose, the Zander apparatus cannot take the place of manual massage, but

may exercise the hand grips of such kind as enter into a general medical gymnastic prescription. For valuable help in arranging the above-mentioned equivalents in the denominations of both systems of gymnastics I have to thank Dr. Emil Zander. I sincerely hope that the third edition of my handbook will meet with the same kind reception in England and America as the first one did, both amongst gymnasts and members of the medical profession.

Stockholm, October, 1905.

ANDERS WIDE

PREFACE TO THE FIRST SWEDISH EDITION

There is scarcely any clearer evidence that the inheritance left to his countrymen by the talented Peter Henry Ling in his systematized and scientifically based method of Gymnastics has been well maintained and improved by them than the fact, that the whole civilized world is now acquainted with that method, and honours not only the master but also the land to which he belonged by its general adoption of the term "Swedish Gymnastics." Even previously to Ling's death in 1839, two State institutions were founded in Stockholm—the Central Gymnastic Institute, 1813, and the Gymnastic Orthopedic Institute, 1827, in which Ling's Medical Gymnastics has been chiefly developed.

In 1857 Dr. G. Zander began the development of Medico-mechanical Gymnastics. In consequence of the excellent work of Zander himself and of several of his pupils, the mechanical method of Gymnastics has been more scientifically developed than has the manual, although the latter method has benefitted by Zander's work, since both systems are based upon the same principles.

Major Thure Brandt is another distinguished pioneer in the annals of Medical Gymnastics, who as early as 1861 introduced the system for the treatment of uterine disorders.

As advocates of Manual Medical Gymnastics may be named, in the very first place, Drs. Herman S  therberg and T. J. Hartelius, both of whom have written extensively upon the subject.

The need of a complete hand-book of Medical Gymnastics has long been felt. New medical theories are put forth every year and it is necessary for the practising gymnast to pay attention to them if he is to keep pace with this restless progress. It is by no means a light task to write a hand-book of Medical

Gymnastics and for this reason especially, that the wider the sphere of activity Medical Gymnastics has obtained during the course of time and will continue to gain, in the treatment of a number of various diseases, the greater will be the knowledge and study of modern Medical Literature required on the part of the author if he shall at all satisfactorily carry out his task. It is not for me to decide in what degree my book will supply the want I consider to exist for such a work, but it is my hope that both gymnasts and medical students will find it a useful supplement to their previous knowledge. The persons last mentioned have already seen the necessity of a knowledge of the employment of Gymnastics and have themselves demanded the instruction which is now given on the subject at the Medical High-schools of Stockholm and Upsala.

A great number of foreign physicians have also visited Stockholm during the past twenty or thirty years, in order to study at the Gymnastic Institutes, so that, as Dr. Zander once remarked, "we Swedish physicians repay, by means of our Gymnastics, what we have formerly obtained from abroad in other branches of medicine."

In order that gymnasts may have still greater use of my work, I have thought myself obliged to insert the description of a number of cases of illnesses which have been treated by means of Medical Gymnastics, and as a consequence of this, the work has attained dimensions considerably larger than those originally intended. Here and there I have been obliged to touch upon Massage and Orthopedics in connection with gymnastic treatment. In many cases, especially in diseases of the joints, Massage must be used as well as Medical Gymnastics; it is, moreover, almost impossible to make any clear distinction between Medical Gymnastics and Massage. Orthopedics is, in many cases, the best remedy in the treatment of bodily deformities and of certain forms of nervous diseases. I have wished to draw attention to this importance of Orthopedics for the reason that gymnasts need

to be made acquainted with the necessity for its use. Medical Gymnastics does not exclude the simultaneous use of other remedies and its therapeutical value is not lessened by the fact of other means being employed.

And, finally, it is a very great pleasure—an obligation—to here express my warmest thanks to several of my esteemed colleagues in Stockholm, as well the clinical doctors as other specialists in various branches of medicine, for the opportunities given me to treat cases of any greater interest and also for their great willingness to examine such cases where there was any uncertainty as to the correct diagnosis.

Stockholm, March, 1899.

ANDERS WIDE

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MEDICAL AND ORTHOPEDIC GYMNASTICS

THE CLASSIFICATION OF GYMNASTICS

P. H. LING classified and defined Gymnastics in the following manner:

1) "**Pedagogical Gymnastics**, by which we learn to place our body under *our own control*." Pedagogical Gymnastics is often called Educational Gymnastics, sometimes simply "Gymnastics," and many of its forms of movement are also used in Medical Gymnastics. It is the basis of all Gymnastics, so that a special knowledge of the same is of importance to each practitioner of Gymnastics; it is besides entirely through Pedagogical Gymnastics that we best develop our own body.

2) "**Military Gymnastics**, by which we try, through some object exterior to ourselves, i.e. weapons, or by our own physical power, to subject a *second exterior will* to our own will"; thus including fencing or bearing of arms in general.

3) "**Medical Gymnastics**, by which, either alone, in a suitable position, or with the assistance of others, we try by means of influencing movements *to alleviate or overcome the sufferings* that have arisen through abnormal conditions."

4) "**Æsthetic Gymnastics**, by which we try to physically exemplify our *inner being*—our thoughts and feelings."

It is not uncommon to divide Gymnastics into **Free Exercises** and **Exercises with Apparatus**, besides which the different apparatus form the basis for further divisions of movements, but as the most varying movements can be per-

formed by means of one and the same apparatus, such a division is unsuitable. The same basis for division is adopted when classifying Medical Gymnastics as:

Manual- and Mechanical- or Machine-Gymnastics; the meanings of which terms are self-evident.

Free-standing movements, or free movements in Gymnastics, ought not to be confused with Pedagogical Gymnastics. It is clear that free-standing movements can be used in Pedagogical as well as in Medical Gymnastics. The same applies to apparatus exercises.

The terms **Dietetic-** and **Exercise-Gymnastics** are also easily understood.

KINDS OF MOVEMENTS IN MEDICAL GYMNASTICS.

The different kinds of movements which are used in LING's System of Medical Gymnastics are divided into Active, Passive, and Duplicated movements.

For the attainment of greater clearness in regard to the physiological action of a muscle during different movements, which is of importance in teaching, the following arrangement of the various kinds of movements has been used:¹

I. Active Movements are divided into:

1. Free Active Movements.

2. Resistive Movements.

a) *Shortening movements, or concentric movements.*

b) *Lengthening movements, or excentric movements.*

3. Gymnastic Holdings.

II. Passive Movements are divided into:

1. Passive Movements with some part of the patient's body.

2. Passive Movements on some part of the patient's body.

¹ The above arrangement of definitions is worked out with the help of J. E. Johansson (Professor in Physiology in Stockholm), who has carried on a series of experiments concerning the muscle work of the human body. which work has only been published in part up to the present date.

1. An Active Movement is any kind of movement which produces any muscle action on the part of the patient.

1. A Free Active Movement is a movement which the patient performs by his own force and of his own free will.

In this case we have a *positive muscle action*, the muscle is shortened and performs an external positive work. Under this description are included all the movements in Pedagogical Gymnastics.

2. A Resistive Movement, also termed a **Duplicate Movement**, may be performed in two different ways:

a) *The patient performs the movement whilst the gymnast gives resistance in proportion to the strength of the patient and the desired result.*

Even in this case a positive muscle action occurs, the muscle shortens and performs an external positive work. The movement is best described as a *shortening movement*, it was called *duplicate-concentric* and *active-passive* by LING.

b) *The gymnast performs the movement with a part of the patient's body whilst the patient makes resistance.* In this case occurs a negative muscle action, the muscle is in a state of contraction through lengthening, and instead of the muscle performing, as in the former case, an external work, in this latter instance a certain amount of energy is conveyed to the muscle (Johansson). The movement is best described as a *lengthening movement*; was called *duplicate-excentric* and *passive-active* according to LING.

3. Gymnastic Holdings are placed in the Swedish Gymnastic System as movements. In this case a *static muscle action* occurs. The muscle is in a state of contraction, without becoming either shorter or longer. No movement proper takes place, and no motion is either performed by the muscle or any energy conveyed to it.

Various muscle groups are found to be in a state of static contraction, where the balancing or fixing of one or several parts of the body is concerned, especially in producing correcting (starting) positions in the treatment of lateral curvature of the spine, of which more will be said under the description of their treatment.

From the above-mentioned definitions of movements it is evident that resistive movements and holdings are of a different character from free active movements. The difference is that in free active movements, lengthenings, movements, and holdings, the patient himself determines the strength of the movements, whereas, on the other hand, in shortening movements, as in the passive, the gymnast decides the strength.

When the terms concentric and excentric are used in Gymnastic terminology in connection with the above-named movements, the movement is not regarded in relation to the joint, but to the muscle or muscle group itself, which is active during the movement, and with the "centrum" as imagined in the middle of the muscle. Thus, for example, a concentric movement is performed by the biceps brachii, when flexion takes place in the elbow joint, whilst the gymnast's resistance is placed on the flexor surface of the patient's forearm; if the gymnast with the latter grasp stretches the patient's bent arm whilst the patient offers resistance, an excentric movement occurs in the same muscle.

II. A Passive Movement *occurs when one or more gymnasts perform a movement with or on some part of the patient's body, without the patient giving resistance or resisting in the execution of the movement.*

Thus under the term "Passive Movement," Swedish Medical Gymnastics include, not only movements executed *with* part of the patient's body, but also *on* it, and this has held good ever since LING introduced his system. Some authors have lately tried to set up a distinct limit between Medical Gymnastics and Massage, and for this reason declare that movements *on* the patient ought to be assigned to massage, because no joint movement is performed *with* the patient, neither does he himself perform any such, which is of course true if one keeps to the strict sense of the word. Such an utterance, however, only shows ignorance of Swedish Gymnastics, and I find no reason to question LING's classification.

1. Passive Movements with any part of the body include all so-called joint movements which the gymnast per-

forms *with* some part of the patient's body while the patient is passive, and are styled **Passive joint movements**.

2. **Passive Movements on any part of the body** which include all the movements which the gymnast performs *on* any part of the patient's body while the patient is passive, are styled **passive hand-grips**, or **Gymnastic massage manipulations** (Zander). To LING'S System is thus enumerated *Hacking, Clapping, Beating, Kneading, Sawing, Pressing, Shaking, Vibration, Stroking, Friction*; under these movements can also be included all used massage hand-grips.

GYMNASTIC APPARATUS

are not absolutely necessary to the practice of Medical Gymnastics. Only the most necessary are given here, as well as measurements for the sizes which gradually acquired experience has proved to be most advantageous (see illustrations in the plate)

High Plinth.¹ Two or three different kinds are usually used and for different purposes.

Dimensions in centimetres			
	No. 1 Fig. a.	No. 2 Fig. b.	No. 3 Fig. c.
Length	115	130	115
Height.....	75	78	65
Width of seat.....	35	44	35
Width on floor	65	70	65
Width of foot-board.....	18	20	18
Height of foot-board from floor	34	22	22

Plinth No. 1 is used to advantage in giving trunk movements to children and in the treatment of spinal curvatures.

Size No. 2 is used in giving the above-mentioned movements to adults, and, in general, when a patient shall take the lying position on high plinth.

High plinth of size No. 3, on account of being lower, is

¹ By this is meant a kind of wooden bench, of the dimensions, given above, on which the patient is placed.

best suited for chest-liftings, double arm-rollings etc. If only one high plinth be desired, size No. 1 should be selected.

Low Plinth consists, as fig. d shows, of a back-support which, in relation to the proper seat, can be placed at 10—12 different heights between the vertical and horizontal positions, by means of which the patient can take sitting, half-lying or lying-position. Besides this, in front there is a movable foot-board adjustable at different distances, against which the legs can be supported in different positions. Supports for the arms belong to the complete outfit of a low plinth but are not absolutely necessary. The size that has proved to be the best is the following: Length of seat, 50 ctm.; length of back-support, 75 ctm.; width of plinth, 52 ctm.; height of seat from floor, 38—46 ctm.; length of plinth on floor, 72 ctm.; length of foot-board, 30—50 ctm.; height of arm-support, 25 ctm.; length of arm-support, 55 ctm.

Boom (bar), fig. e, should be adjustable at 20—25 different heights, at distances varying between 50—150 ctm. from the floor. The boom can be made of an ordinary plank when it is used only for the leg lean-standing position, but it is better that the upper part and sides should be stuffed and covered.

Heave-plank (in construction resembling the boom) or **Trapeze**, fig. f, is generally adjustable at different heights, but this is not necessary, as the patient can easily mount a stool to reach the apparatus.

Rib-stool, fig. g, and **Peg-post**, fig. h. The peg-post generally reaches from the floor to the ceiling but the rib-stool is only about 250 ctm. from the floor, or so high that its top rib can be reached by a full-grown person in stretch-standing position. The distance between each peg or rib is from 10 to 15 or 18 ctm., their thickness such that the patient can conveniently clasp them with the hands.

Poles, fig. i, should be round, with a transverse diameter of 6—8 ctm. and a height of about 250 ctm. It is of advantage to use three poles, one of which is fixed, the two others movable, and so arranged that at the top and bottom they are

united by a cross-bar at a distance of about 70 ctm. from each other, and furnished with pulleys running in grooves.

Ropes of 5—6 ctm. in diameter can, if necessary, be used instead of poles but are otherwise unnecessary in Medical Gymnastics.

Table, fig. k. For this a high piano-stool (Vienna model) is used that can be raised. It is employed for arm- and hand-movements.

Stools, fig. l, simple but firm and without backs, should be found in sufficient numbers in a Medical Gymnastic Hall. It is most advantageous to have stools of different heights suitable to different ages. Size of seat should be 40 ctm. square, height of stools respectively 30, 36 and 42 ctm.

Foot-stools, fig. m, 22—25 ctm. in height, 50 ctm. in length and 25 ctm. in width, should also be found in sufficient numbers.

Forward-drawing-ropes, fig. n, about 1 metre long and furnished at both ends with wooden-handles.

Rods, fig. o, round, 3 ctm. in diameter and of different lengths; for example, 30, 45 and 70 ctm.

Cushions, fig. p, 40 and 50 ctm. square, are used in the fundamental kneeling-position on the floor, and in supporting the backs of children when placed on the low-plinth when the gymnast wishes to diminish the length of the seat.

One part of the apparatus here mentioned should be stuffed and covered, namely, the high and low plinths, boom, table and a few stools. Hard-stuffing is best and the covering of shag in some dark colour. The advantage of using plush is, that the patient can be better fixed upon it, while on the other hand, if the apparatus be covered with smooth material or leather, he can easily slip out of position when performing the movements.

THE GYMNASTIC TERMINOLOGY

has not been subjected by me to any essential changes but is employed as sanctioned by long usage in Swedish Gymnastics. This is of importance also from the point of view that full conformity, as far as possible, should prevail between Pedagogical and Medical Gymnastics. The Swedish Gymnastic terminology has been decried by many writers and several have attempted to change it but have, however, as yet, not succeeded, probably chiefly for the reason that in reality it is so simple and clear, that no very great improvement could be effected. The principles on which the Swedish Gymnastic terminology is based, are recognized as excellent by everyone who takes the trouble to become familiar with them, since the terminology gives briefly not only the movement to be performed, but even names in detail the position which shall be taken for it, where other Gymnastic systems use circumlocutions, and—observe—all this in the Swedish terminology is given in most cases, in one single line. Besides, the Swedish denominations for the different forms of movements have already found their equivalents in most foreign languages; this has easily been accomplished in the Germanic tongues but meets with more difficulty in the Romanic. There are, however, in the Swedish Gymnastic terminology a few expressions never otherwise used in the Swedish language, so that there is every justification in attempting improvements whenever quite fully clear Swedish words can be used. The most commonly used expressions which can not be understood without an explanation, are the following:—

“Grasp”—is an expression much used. It means that the patient takes hold of some instrument or, in absence of this, the hands of a gymnast (see fig. 25)

“Stride”—signifies that the feet are placed at a distance of two foot-lengths from each other (see page 30).

"Lean"—signifies that the patient supports some part of his body against a wall, boom, or other apparatus, for example, arm-lean, side-lean, hip-lean, back-lean, chest-lean; in leg-leaning the heels receive support from behind by means of a "rib" or narrow plank fixed to the floor (see fig. 17).

"Lax"—signifies, in Gymnastic language, that the trunk is bent forward and that the abdominal parietes are at the same time relaxed, that is, the muscles are placed in a state of inaction. The arms can hang freely or may rest against some support at the sides of the trunk.

"Stoop"—signifies that the trunk is bent forward by flexion of the hip-joints, while the spine is kept straight.

"Half"—means, that only one arm or leg is moved in any gymnastic position: for example:—half-stretch means that one of the arms is in stretch position. But as it is necessary here to add "left" or "right" the expression "half" is quite superfluous. "Half" means in the combination half-lying, a position between lying and sitting but with support for the back.

"Double"—means that both arms or both legs' are moved in the same position.

THE EDUCATION OF A GYMNAST

In order to be qualified in Sweden by the Royal Medical Department as a Medical Gymnast it is necessary to have passed through the Royal Gymnastic Central Institute. For men the course at the Institute is three years; for women two years. All must go through a complete course in both Pedagogical and Medical Gymnastics; the course for men is one year longer, as they must also be instructed in Military Gymnastics.

¹ In the following pages '*the leg*' signifies the whole limb; 'the upper leg' = the thigh, and 'the lower leg' = from the knee downwards.

There is a course of one year for Doctors, which includes Pedagogical and Medical Gymnastics.

The Medical Gymnastic course includes the Anatomy of the Human Body, Physiology, and the Theory and Practice of Medical Gymnastics. The pupils must devote at least 3 hours daily to the treatment of patients.

For the admittance of men to the Gymnastic Central Institute it is necessary for them to have taken the matriculation at some Public College, and for women to have passed the final examination at a corresponding High School for girls.

When also, for the admittance of the pupils, the standard of physical development can be made as high as may be desirable and as only about one-fourth of the applicants for each course are accepted, it should be clear that the Swedish Medical Gymnast is in all probability competent in every way to fulfil his calling.

Should any special qualifications be accentuated as necessary for a Medical Gymnast to possess, we should mention in the first place:—a good physical constitution, a strong and well exercised muscular system, inborn lightness and acquired litheness in all movements, perseverance in work, thoroughly good health with a decided disposition to take care of it, and an even, good and bright temperament.

Besides the examined and qualified Medical Gymnasts, a great number of so-called Medical Gymnasts are at work who have had no, or a very incomplete training, an irregularity which prevails not only in Sweden but, still worse, also abroad, where such quacks give themselves out to be duly qualified Gymnasts. The consequence of this has been that Swedish Gymnastics does not enjoy the reputation it otherwise so well deserves.

GYMNASTIC POSITIONS

Thereby is meant, in Swedish Gymnastics, the position a person takes for the performance of a movement. Several different positions can be used for one and the same movement, but, as a rule, it holds good that each particular movement is best performed in a specially given position which is easy for the skilled gymnast to find; the unskilled, on the contrary, often commits mistakes in the choice of the position and thereby proves his want of practice.

In all Gymnastics the positions must be most carefully kept so that in active movements and in movements with resistance a fully correct bearing is taken; in passive movements the gymnast should see that the part of body to be treated is quite at rest, when it is meant to be so, and that the body of the patient is in as comfortable a position as possible without this interfering with the gymnastic position of the body.

Fundamental Positions are distinguished from *Derived Positions*.

FUNDAMENTAL POSITIONS

Swedish Gymnastics comprises *standing, sitting, lying* and *hanging* fundamental positions, out of which a number of different derived positions arise. The *kneeling* position is also generally classified as being a fundamental position, although the movements arising from it do not in any essential degree differ from those in the corresponding standing fundamental position.

I. Standing Fundamental Position

The standing fundamental position arises: when the feet are placed at right angles, the one as far forward as the other, and with the heels close together; the legs are kept well stretched not only in the knee but also in the hip-joints; the spine is kept stretched and straight in all its length, by means



FIG. 1.

of which the pelvis is carried in a forward-upward direction, the abdomen becomes drawn in, the chest, on the other hand, arched forward and expanded; the head is carried high on the stretched neck; the chin is kept in, the gaze directed forward somewhat above the horizontal plane; the shoulders are well carried back, the arms can hang freely of their own weight, slightly bent in the elbow-, wrist- and finger-joints, with the

finger-tips placed close together and kept close to the outer side of the legs.

The standing fundamental position is the type for Gymnastic bearing so that what holds good for that can, in applicable parts, be relevant to other positions of the body.

II. Sitting Fundamental Position

The buttocks and thighs rest on some horizontal support; the knee- and ankle-joints are kept at right angles and the feet rest on the floor or on some other support; the legs are kept close together in all their length; the arms hang freely close to the body. Otherwise the bearing of the body is the same as in the standing fundamental position.

III. Lying Fundamental Position

In the lying fundamental position the whole body rests outstretched with its back surface on the support; the legs are kept close together and the arms close to the body but resting on the support.

This position has been described in Swedish Gymnastic literature as "rest-position" which, of course, it is not, as a number of muscles must be put into action in order that the position can be taken and retained. But the so-called hook-half-lying position, on the contrary (compare fig. 30 and page 39), is a real rest-position. If such a one shall be attained every part of the body must take a medial- or rest-position. This arises when every part of the body, as far as possible, is just between flexion and extension, ab- and adduction, outward and inward rotation or, in one word, just between all extreme positions.

IV. Hanging Fundamental Position. Fig. 2

The hands, separated from each other by the full breadth of the shoulders, take hold of heaving-pole, boom, trapeze, ropes or other apparatus, placed at such an height that the feet do not touch the ground when the arms, trunk and legs



FIG. 2.

are fully extended. The hands take hold of the apparatus in a lean-hanging manner (see fig. 2). The head can be carried a little backward, whereby the upper part of the spine forms a slight arch forward and a firm and graceful hanging position is attained. The bearing of the body is otherwise the same as in the standing fundamental position. The gymnast must be particular to see that all the details above mentioned are observed, as mistakes can easily be made in taking the hanging position.

V. Kneeling Fundamental Position

See fig. 73.

The kneeling fundamental position differs from the standing only in this respect, that the patient supports himself on his knees and lower legs (but not with the feet) which are closely drawn together, on a plinth or cushion. If the trunk be carried in a slight arch forward, the balance is better maintained and the weight of the body will entirely rest on the lower legs. This fundamental position is in itself rather unsteady, but in most movements the gymnast gives support to the patient's back, by which means more steadiness is gained. The kneeling fundamental position is however of so little importance and is so seldom employed that it might altogether have been omitted. It has been used and considered to be of special importance when the object has been to work upon the abdominal and pelvic organs.

DERIVED POSITIONS

Derived positions arise whenever a deviation is made from the fundamental positions, either with the arms, legs or trunk, without the bearing of the body in other respects being altered from the fundamental position. When such a change or re-

moval can be made with one or both arms, one or both legs or with the trunk, each by itself or with several parts of the body simultaneously, the result is that a very great number of different positions can be arranged, which was also done during the earlier developments of Gymnastics. Only those positions are adopted here that are of any practical importance.

I. a) POSITIONS DERIVED FROM THE STANDING FUNDAMENTAL POSITION BY MOVING THE ARMS

I. Hips-firm-standing. Fig. 3

The hands take hold of the hips above the hip-bone (the crest of the ilium) so that the closed tips of the four fingers



FIG. 3.

placed close together lie on the front of the anterior extremity (the anterior superior spine of the ilium) and the thumb is di-

rected backward. The elbows are also carried backward, so that they lie a little behind the frontal-plane of the shoulders. The hips-firm-standing position gives increased firmness to the trunk and is therefore used in free-standing movements both with head, trunk and legs.

2. Bend-standing. Fig. 4

The forearms are kept in extreme flexion and supination with the fingers close together and slightly bent, whilst the



FIG. 4.



FIG. 5.

upper arms are retained in the fundamental position. Bend standing position forms the first moment in arm-extensions.

3. Swim-standing. Fig. 5

The arms are kept in the horizontal plane of the shoulders with the upper arms well drawn back, the forearms in extreme

flexion-position, the wrists and fingers close together and the palms of the hands turned downwards. This position is the first moment in armcasting.

4. Yard-standing. Fig. 6

The arms are kept stretched outward in the horizontal plane of the shoulders and are carried somewhat backward, the



FIG. 6.

fingers are stretched and kept close together, the palms of the hands turned downwards.

5. Heave-standing. Fig. 7

There are two different kinds of heave-standing positions used in Medical Gymnastics; they are derived from the yard-standing position by:

a) the forearms being carried straight upward to right angles at the elbow-joints with the palms of the hands turned inward towards each other so that the hands are in the sagittal plane.



FIG. 7.

b) the under-arms being carried forward, so that they form right angles to the upper arms at the elbow-joints.

6. Reach-standing

Arms and hands are kept in extreme extension straight forward in the horizontal and sagittal planes with the fingers close together.

7. Arm lean-standing.

Fig. 8

Arm-lean-standing position arises from reach-standing, if the palms of the hands, with the fingers directed upward, rest against a wall or some other object, when it is not necessary however that the arms be kept in full extension.



FIG. 8.

8. Neck-firm-standing. Fig. 9

Neck-firm-standing position arises, if from yard-standing position the hands are carried upward-backward and the finger-tips placed on the lower part of the neck, so that the tips of the middle fingers are separated a few ctm. from each other



FIG. 9.



FIG. 10.

or only just touch each other. The hands are held in the frontal-plane with the palms turned forward. The mistakes that can easily be made, especially by children, in taking this position are, that the elbows are carried forward, that the wrists and finger-joints are not in full extension or that the

head is bent forward. The neck-firm-standing position is preferably used in treating curvatures of the spine.

9. Forehead-firm-standing

arises from neck-firm-standing position if the finger-tips be placed on the forehead instead of on the neck.

10. Stretch-standing. Fig. 10

The arms and hands are kept in extreme extension straight upward with the hands in the sagittal-plane and the palms turned towards each other. The position will permit of the strongest effects and the chest be best expanded, if the arms be carried somewhat backward and the hands separated rather more than a shoulder's-breadth from each other.



FIG. 11.

11. Crutch-standing.

Fig. 11

A boom is placed under one of the arm-pits, so that this obtains a firm support, as when over a crutch. This position is the best for side-flexions in the region of the neck in the treatment of cervical-scoliosis.

If the hands, in yard-, heave-, reach- or stretch-standing take hold of some

apparatus the following movements arise out of these derived positions:—

Yard-grasp-standing, heave-grasp-standing, reach-grasp-standing, stretch-grasp-standing.

I. b) POSITIONS DERIVED FROM THE FUNDAMENTAL STANDING POSITION BY MOVING THE LEGS

1. Close-standing

The close-standing position arises from the Fundamental Standing Position by closing the feet so that they touch each other on the inner sides all along their length.

2. Toe-standing

Arises from the Fundamental Standing Position by raising the body, so that its weight rests entirely on the balls of the toes but taking care that the heels touch each other all the time.

3. Knee-bend-standing.

Fig. 12

Arises from the Standing Fundamental Position by bending the legs at right angles in the knee-joints, in doing which the knees are carried outward-forward in the direction of the feet.

By combining the two preceding positions, *knee-bend toe-standing* is obtained, fig. 12.



FIG. 12.

4. Walk-standing, see fig. 53

This position arises, when one of the feet is moved two foot-lengths straight forward or outward-forward in the direction of the foot, at the same time that the weight of the body is moved, so that it rests equally on both legs.

5. Stride-standing

The feet are moved directly outward, so that they are separated about two foot-lengths from each other, but still forming right angles with each other, as in the fundamental position. The weight of the body rests equally on both feet. This position is also advantageously called *broad-position*.

By combining two or more of the above-described positions other derived positions are formed, such as, walk-knee-bend standing, stride-knee-bend standing, etc., but which rather belong to Pedagogical Gymnastics.

6. Half-hook-standing

The one leg is held uplifted in a straight forward direction so that it forms a right angle in hip-, knee- and ankle-joints, without the fundamental position being otherwise sacrificed. The given position arises in "knee up-bending, on the spot march."

If the raised foot rest on something the position is called "*step-standing*."

7. Fallout-standing. Fig. 13

One leg is moved forward or backward from the fundamental position, in the direction of the foot, three foot-lengths; the anterior knee is bent just so much, that it is brought just over the toe-tips, the other leg is kept in full extension; the trunk is carried forward-outward above the bent knee; the corresponding arm is stretched upward-forward-outward, so that this arm, the trunk and the extended leg lie in the same

plane. The downward stretched arm is carried somewhat from its side, so that, if possible, the arms can be kept parallel, as by so doing, the balance is better maintained. On changing the fallout movement to the opposite side, the arms are moved to bend position (Fig. 4), while the body takes an upright position. Fallout movements are powerful and graceful, but demand accuracy in execution. They are used to advantage in free-standing Gymnastics.



FIG. 13.

I. c) POSITIONS DERIVED FROM THE FUNDAMENTAL STANDING POSITION BY MOVING THE TRUNK

Gymnastic Positions arise by changing the position of the trunk, as in bending forward or backward, in bending to either side and in twisting. When trunk-movements are used in free-standing Gymnastics, flexion forward and backward is generally performed in stretch- or hips-firm-standing position; side-flexions in stretch-standing or standing fundamental position; twisting in neck-firm or yard-standing position. Forward-

bending can take place in the spine alone, in the hip-joints alone, or in both together, from which three different positions arise.

1. Forward bend-standing

2. Stoop-standing. Fig. 14

Fig. 14 shows: hips-firm stoop-standing position.

3. Lax-stoop-standing



FIG. 14.

Stoop-standing is the only one of these that is of any real use. Flexion (in the hip-joints) is performed to its greatest possible degree, with simultaneous full extension of the knee-joints. The head is kept slightly bent backward, the gaze is directed forward.

In taking stoop-standing position the arms hang freely by their own weight. This position has been used for abdominal-side-shaking.

4. Backward bend-standing.

Fig. 15

This arises if the whole spine be bent backward as far as is possible, without otherwise sacrificing the fundamental position.



FIG. 15.



FIG. 16.

5. Side bend-standing.

Fig. 16

Bending of the whole spine to either side. An incorrect position is easily taken by twisting forward either the shoulder or hip on the same side as that to which the bending is directed.

6. Leg-lean-standing. Fig. 17

For an explanation of the term "*lean*" see page 17.

This Position is much used, partly for the movement "leg-lean-standing raising," partly in the treatment of scoliosis.



FIG. 17.

7. Twist-standing

results from twisting from the fundamental position to either side, as far as is possible without altering the position of the feet, and without changing the relative position of the head and shoulders to each other.

A few other derived and combined positions arisen from several of those given above, have formerly been used, but are of doubtful use.

It is, on the other hand, necessary to say that in some movements, one side must be turned toward the apparatus or rest against it, and the name of the movement is then given, as thus, for example:—

Left side lean-standing

Right hip lean-standing

II. a) POSITIONS DERIVED FROM THE SITTING FUNDAMENTAL POSITION BY MOVING THE ARMS

While keeping to the rules mentioned on page 21, for the sitting fundamental position, these positions are taken in quite the same manner as the standing positions. The following are those most generally used:—

- 1. Hips-firm-sitting**
- 2. Yard-sitting**
- 3. Heave-sitting a) and b)**
- 4. Reach-sitting**
- 5. Arms-lean-sitting**
- 6. Neck-firm-sitting**
- 7. Stretch-sitting**

II. b) POSITIONS DERIVED FROM THE SITTING FUNDAMENTAL POSITION BY MOVING THE LEGS

1. Long-sitting

The legs rest with all their length on a bed or other support.

2. Half-sitting. See fig. 49

The patient stands on one leg, which thus carries the weight of the body. The back of the thigh of the other leg

rests on a boom or other apparatus situated so high that the leg forms a right angle at the hip-joint.

3. Stride-sitting

Arises from the sitting fundamental position by carrying the legs apart, so that the feet and lower part of the legs are separated two foot-lengths from each other.

4. Ride-sitting. See fig. 39

Differs from the preceding only in this respect, that the patient sits astride on some apparatus, a stool or high plinth, so that both knees receive support on the inside, just as when one sits a horse. Stirrups are also generally used together with some kind of support for the upper legs, whereby the position is still further strengthened, fig. 67. This position is much used in movements of the trunk.

II. c) POSITIONS DERIVED FROM THE SITTING FUNDAMENTAL POSITION BY MOVING THE TRUNK

1. Stoop-sitting

and

2. Lax-stoop-sitting

Compare page 32.

3. Twist-sitting

Compare page 34.

4. Fall-sitting. See fig. 67

Results from bending the trunk backward in this way, that the trunk from sitting, long-sitting or ride-sitting positions, can fall back, as far as is physically possible—to an angle of 45° or even to a horizontal position, while support is given to the patient's knees or feet. To keep the body in this position the abdominal muscles are strongly taxed, so that it re-

quires considerable practice to be taken up well, i. e., in order that no deviations from the fundamental position of the trunk may take place.

Spring-sitting

This position is only used in the form of:



FIG. 18.

Spring-sitting holding, fig. 18,

which results from fallout standing (fig. 13, page 31), if the anterior bent leg rests on a stool so that the whole of the buttocks and upper leg are supported on the same.

Combinations of several derived positions are often used, and can easily be made by any gymnast without their being described here; only two of the most generally employed need be given as examples, namely:—

Hips-firm ride-sitting. Compare fig. 68

Stretch stoop-stride-sitting. Compare fig. 44

III. a) POSITIONS DERIVED FROM THE LYING FUNDAMENTAL POSITION BY MOVING THE ARMS

- 1. Hips-firm-lying,**
- 2. Neck-firm-lying,**
- 3. Stretch-lying**

are, in point of fact, the only positions used; the last-mentioned is of great importance as a well-fixed position for arm- and leg-movements, especially for children.

III. b) POSITIONS DERIVED FROM THE FUNDAMENTAL LYING POSITION BY MOVING THE LEGS

- 1. Stride-lying,**

the feet separated two foot-lengths from each other.

- 2. Hook-lying**

The legs are kept bent, so that they form an acute angle at knee-joints. The feet should have good support from below, best on a low plinth or sofa.

- 3. Sit-lying. See fig. 43**

Arises from the fundamental lying position, if the lower part of the patient's legs hang over the apparatus; best a high plinth.

Some of the positions derived from the last-named position are much used in medical Gymnastics, for example:—

Hips-firm sit-lying, and

Stretch sit-lying, fig. 43

III. c) POSITIONS DERIVED FROM THE FUNDAMENTAL LYING POSITION BY MOVING THE TRUNK

1. Half-lying. See figs. 36 and 24

The patient rests on a low-plinth, the back-support of which is placed at an angle of about 45° against the horizontal part of the plinth. The legs rest outstretched on the front of the movable part of the plinth or else bent in the knee-joints, so that the feet rest on the floor.

This derived position is much used; as, for example, in treating the chest organs, heart-hacking, chest-hacking, kneading of the muscles of the chest and arms, etc.

2. Hook-half-lying. See fig. 30

Differs from the preceding only in this, that the legs are kept drawn up, so that they form right angles at the hip- and knee-joints, whilst the feet rest on the foot-board of the plinth.

This position is the best in treating the visceral organs of the abdomen, for example, abdominal-kneading, because the abdominal parietes become relaxed and pliable to the utmost extent.

The gymnast should therefore also see that the patient takes a complete rest-position, so that not only his back but also his arms entirely rest on the plinth. A small cushion can be used to advantage under the patient's head. This position has been described before on page 22 as a rest position or medium position.

3. Forward-lying

The anterior surface of the body rests outstretched on a sofa or plinth, in some cases with support for the forehead against a cushion, in other cases, with the lower part of the arms supported against it, so that the head and upper part of the chest are kept raised from the sofa.

4. Leg-forward-lying. Fig. 19

This position is generally called forward-lying and is used in Medical Gymnastics only for "*forward-lying-holding*" and movements arising from it. The position is taken up so that the patient places himself on his knees, which are closely placed together on a high plinth and so far forward on the same, that when he falls forward in forward-lying holding, he has support for the legs as far as up to their upper third part.



FIG. 19.

On this movement taking place the patient should take support with his hands on the gymnast's shoulders, whilst the latter takes hold of the patient in front under the arm-pits. The same hold is used in returning from forward-lying to kneeling. The patient should keep his legs close together with the feet turned outward. The "Over-sitter," who gives support to the patient's lower legs, should sit on the middle of them, and, with his whole weight, so that proper support is obtained; he

should take this position, whilst the patient is still in kneeling position and continue to keep it, until the patient, after having finished the movement, returns to kneeling position.

5. Side-lying

Means, in the ordinary use of the term, that the whole body rests on either side, but it is also a designation for the leg-side-lying position.



FIG 20.

Leg side-lying. Fig. 20

In this position the legs alone rest on the support, as shown in fig. 20. The leg lying nearest the plinth, rests on it, from the hip to the foot. The uppermost leg, which should lie behind the other, rests on the plinth only with the lower leg. The "Over-sitter" should sit as far down on the lower legs as possible. This position is taken from the kneeling position in the manner that has before been described, page 40, under forward-lying holding.

IV. POSITIONS DERIVED FROM THE FUNDAMENTAL HANGING POSITION.



FIG. 21.

Heave-hanging, fig. 21,

is the only position derived from the fundamental hanging position, used in Medical Gymnastics. The hands should hold the apparatus at such a distance from each other, that the upper and fore arms form right angles at the elbow-joints, when the heaving has reached such a height that the upper arms lie in the horizontal-plane. In other respects the rules given for fundamental hanging position page 21 hold good.

Fig. 21 shows really "stretch-hanging-heaving with leg-support," but the position of the arms should here also be the same as that above mentioned.

V. POSITIONS DERIVED FROM THE FUNDAMENTAL KNEELING POSITION

are taken in the same way as the standing position ; for example,

Stride-kneeling,

but they are almost entirely out of use.

GYMNASTIC MOVEMENTS

A description of the principal division of the movements in accordance with P. H. LING's system, has already been given.

In order to take the above-mentioned positions, it is necessary, in most cases, that a movement be performed, but, by this, a movement in the Gymnastic sense of the word is not meant. The difference is sometimes only this, that a position is repeatedly taken, through which a movement thus arises.

Several movements are similarly performed, and have a similar effect, or it can even be that one and the same movement is made, although under a different name, so that they could be suitably divided into groups, as in the arrangement made below.

It would be easy to arrange the movements within the same group according to their different strengths, from the weakest, by a gradual increase, to the very strongest.

Such a division when describing the movements, is superfluous, as every gymnast should himself have sufficient judgment and experience to arrange the movements after their strength; and this will also repeatedly be pointed out in giving the description of the treatment of special maladies.

The movements generally used in Medical Gymnastics are the following:—

Hacking.	Flexion and Extension.
Clapping.	Carrying.
Beating.	Swinging.
	Drawing.
Kneading.	Abduction and Adduction.
Sawing.	Raising.
Pressing.	Falling.
	Ringling.
Shaking.	
Vibration.	Twisting.
Stroking.	Rolling.
Friction.	
	Holding.
Lifting.	
Expansion.	Hanging.
Heaving.	

HACKING (Zander, G)

is done in different ways, depending upon the part which is to be treated:—

1) **Hacking with the finger-tips**, either with the middle-finger alone or with the three middle fingers (called also point-hacking) is used solely over the nerve-fibres, when these lie on the surface and close to some bone, for example on the head. This hacking is generally only done with one hand, whilst the other gives support to the patient's head.

2) **Hacking with the ulnar surface of the little finger** is used on the head, neck and back and especially for heart-hacking. The hacking is then done alternately with both hands; in hacking the little finger is kept abducted and touches the part hacked in such a way, that the finger, as it were, has a springy touch.

3) **Hacking with the dorsal surface of the three inner fingers**, alternately with both hands, is the most usual way of giving back-hacking.

4) **Hacking with the ulnar surface of the whole hand**, when the fingers are kept close together, is used in hacking the muscles of the lower extremities; usually given alternately with both hands.

Hackings require much practice in order to be given well and they are splendid exercise-movements in the training of gymnasts.

Hackings are most agreeable to the patient and, at the same time, least tiring for the gymnast, if given, as far as possible, as wrist-movements and not with the whole arm; the hackings should also be given lightly and elastically, so that the stroke of the gymnast's hand quickly meets the part hacked and as quickly leaves it. Only in muscle-hacking may the movement be given on a wider surface and more powerfully, when the gymnast makes a pressure with his hand at the same time, i. e. he tries to let his stroke be felt as far down as possible.

Hackings are amongst the most agreeable, and therefore the most used, of all movements given in Medical Gymnastics. On the whole, they have a stimulating effect, which can probably be explained from the fact that at each stroke a number of peripheral nerves are affected.

The most general hackings are:—

1) **Head-hacking.** Fig. 22 (Zander, G 5)

The gymnast stands in front of the patient, who takes a sitting position. The hacking begins over the eye-brows, continues up the forehead, over the crown of the head and down the neck, when the gymnast's hands alternately perform the hacking in this way, that the little finger and then each finger in turn, touches the middle line of the head while a slight stroking with the fingers on the side parts of the head is in-

cluded in the hacking. Each hand, in giving such a hacking, should make from 20 to 25 strokes and these must then be repeated in the same order 5 or 6 times, the whole process taking from 5 to 10 minutes, depending upon the effect desired from the movement.

Head-hacking can be given differently for different purposes. If it is the intention to produce a stimulating effect, the finger-tips are used and the stroke is made quicker and rather



FIG. 22.

harder, as, for example, to patients who complain of being continually tired, sleepy and drowsy, so that they cannot think and work with ordinary energy and perseverance.

If, on the contrary, a soothing effect be desired, for example, on patients, who are over-worked, nervous, suffer from insomnia etc., then the hacking is done with the palmar surface of the fingers, slowly, more lightly from the beginning, after which it gradually passes to a slow and gentle stroking with the whole hand, starting from the temples and crown of the head, and continuing down over the neck and sides of the throat.

Head-hacking, given in the manner described by me above, has proved to be very beneficial, both in those cases mentioned as well as for many other different illnesses, especially when it has been supported by a general Medical Gymnastic treatment. That this movement is much liked and that good results can be obtained from it, should be clear from the fact that more than 10% of all the patients treated at the Institute receive it.



FIG. 23.

2) **Back-hacking.** Fig. 23 (Zander, G 1)

The patient takes a standing or sitting position with the arms stretched forward against some support. The gymnast stands behind. Back-hacking is given either with a springy stroke of the little fingers or with the dorsal surface of the three inner fingers, as described above under 2) and 3) pages 44 and 45. In the latter case the hacking is stronger. Hacking is generally given from the shoulders down the whole back, with one hand on either side of the spine, and repeated

in the same order 3 to 4 times, so that about 50 hackings are given each time with each hand. Hacking given in this manner is called

Length back-hacking

Hacking can also be given so that it goes from the middle of the back downwards and out to the sides several times, but each time from different heights from the middle-line out to the same side, until, in this way the hacking has been given all over the back part of the chest, when it is called

Diverging back-hacking

In the same way hacking can be given on different parts of the chest, when the patient usually takes a sitting position; the hacking is then called

Side-hacking

Back-hacking is one of the movements most used in Medical Gymnastics, because it is very agreeable and can be given to advantage against fatigue and back-ache, inflammation and weakness of the muscles, chlorosis and diseases of the heart and lungs etc.

3) Heart-hacking. Fig. 24 (Zander, G 1)

The patient takes a comfortable, half-lying position; the gymnast generally sits on his left side. The hacking is given with both hands alternately as explained under 2), page 44, and is done as lightly and agreeably as possible, over the region of the heart and adjacent parts of the chest. Heart-hacking is often varied with a light, elastic clapping, done with

only one hand, and is finished with a gentle tremble-shaking or stroking. The whole of this process, generally briefly termed heart-hacking, lasts 4 or 5 minutes. More will be said of the importance of this local heart-hacking in describing the treatment of diseases of the heart.



FIG. 24.

4) **Muscle-hacking** (Zander, G 3, G 4)

is given as described under 4) page 45, generally as

Yard-sitting arm-muscle-hacking
and

Half-lying leg-muscle-hacking

If muscle-hacking is to be given on other parts of the body, it would be best to give it as described under 2) and 3) on the two preceding pages, dependent upon the extent of the part to be worked upon.

CLAPPING (Zander, G)

Clapping is done with the palm of the hand and in two different ways:—

1) either, so that the stroke is quick, light and only superficial, so that the hand quickly touches and leaves the part worked on; or

2) so that the stroke goes deeper, which will be the case if, as it were, one rests on the stroke, or, in giving it, uses slight pressure at the same time.

In both these cases the whole of the palm of the hand should be used and meet the part worked on; if, for example, in the first case, only the finger-tips touch, the stroke will be painful to the patient, and this should be avoided.



FIG. 25.

Chest-clapping,

Fig. 25,

is the most important and most used of all clappings and is so done, that the gymnast stands in front of his patient and begins clapping the upper part of the back, continuing slowly out toward the shoulders and down the back, then along the side of the chest and finally on the front, so that the clapping, in this manner, extends all over the chest. In this order the clapping is repeated 3 or 4 times. On the back and front-side of the chest it is best to clap with both hands alter-

nately, but on the sides with both hands together, beginning from the top, under the arm-pit, and gradually going downwards. Chest-clapping should extend as far down as the chest goes, but not further. It can be given fairly hard on the back, but should be weaker in front and on the sides and especially light over the top of the lungs in front because otherwise a cough is easily caused; the clapping should also be lightly done in the hypochondriac region, so that it shall not cause the patient pain.

Chest-clapping is performed in many different positions: best perhaps as:—

Stretch-grasp-standing chest-clapping,

Heave-grasp-standing chest-clapping,

Yard-grasp-standing chest-clapping

and also to advantage as

Neck-firm-standing chest-clapping,

or also, if one wish to make the breathing deeper during the performance of the movement, as

Chest-clapping with double arm-heaving outward-upward

Chest-clapping is principally given in cases of bronchitis and different kinds of shortness of breath and for emphysema. By means of the shaking the chest receives during the clapping the breathing becomes fuller and deeper, besides which expectoration of mucus from the lungs is facilitated. Chest-clapping is further used to advantage in cases of general weakness and convalescence after several different illnesses, when the object is to strengthen the patient by a so-called general treatment; it can therefore also be used for many forms of nervous-diseases.

In chest-clapping the stroke should be light and quick, as also should be the case when using clapping for the extremities in cases of paralysis, and diminished sensibility. In the latter

case it can be given harder, so that the stroke provokes an irritation of the skin.

In giving a muscle-clapping proper the stroke should penetrate deeper and more strongly, as for example, in the following movements:—

Yard-sitting arm-muscle-clapping and

Half-lying leg-muscle-clapping,

which, as a rule, follow muscle-kneading on the respective extremities. For those clappings which begin in the proximal part of the extremities and gradually descend, it is to be observed that the clapping goes round them, a fact that is of special importance to mention, because mistakes are so often made in this respect. Clapping on the extremities can otherwise be given harder on those parts where they are better covered with muscles, but weaker, where the bones lie immediately under the skin.

BEATING (Zander, G 1, G 3, G 4)

Beating is nearly allied to hacking and clapping, so that these three movements can be said to form a common group, as they are all used as muscle-movements and a gradual rise is found in them, so that hacking is the lightest, clapping stronger, and beating the strongest. Beating is given with the not quite closed palmar surface of the hand, and the gymnast should be careful to make the movement a wrist-movement as far as possible (see fig. 26), for if he hold his wrist stiff, the beating will cause unnecessary pain to the patient. If properly executed, beating is a very good movement, although its use is restricted, both as regards the persons and the parts of the body treated. It is good for rheumatism and inflammation in the muscles of the hips and is then called

Hip-muscle-beating,

generally given in forward-lying or arm-lean-standing position. Hip-muscle-beating can extend down over the under-side and

outside of the upper leg, but as this movement is very strong, it should not be used on other parts of the body than those already named, and even then sparingly to others than full-grown persons.

As beating can be given in such a way that the stroke penetrates deeply, it is used to advantage for sciatica.



FIG. 26.

The most ordinary form of beating is

Sacral-beating. Fig. 26

The patient takes a somewhat lean-forward, stride-standing position with the feet turned in and with good support for the hands. The gymnast stands at the side and gives the beating with the one hand, in doing which he lets the strokes fall close together from the top of the one trochanter across the buttocks and the sacrum towards the other trochanter and

so on from different heights, making from 3—5 arch-lines with his beating, so that a sacral beating consists of about 50 strokes. While the beating continues, the gymnast holds his other hand on the lower part of the patient's abdomen; in so doing he gives the necessary support, which can be of importance in treating patients with lax abdominal parietes. This movement is most used, and is of the greatest effect, for certain diseased states of the rectum, bladder and genital organs, of which more will be said later on. It can be sufficient to say here, that experience has proved sacral beating to be of effect in cases of atony of the rectum and bladder.

KNEADING (Zander, J, H)

Muscle-kneading and abdominal-kneading are the most general and important.

Muscle-kneading is performed with the fingers only or with the whole hand, dependent upon the extent of the part to be worked upon. A proper muscle-kneading can really not be made any where else than on the extremities, shoulders and hips. It is of great importance to see that in all muscle-kneadings the part of the body in question be well-placed and supported from beneath, so that the muscles are quite slack, because if but a slight contraction arise, the kneading becomes more difficult to give and, at the same time, of less effect.

Yard-sitting arm-muscle-kneading, Fig. 27 (Zander, J),

is so done, that the gymnast stands at the side of the patient and takes hold of his arm with both hands at the shoulder, squeezes the under-lying muscles, as one squeezes a sponge, and at the same time, during a continual pressure, performs small rotatory movements with the hands, which work in opposite directions. In the same way the kneading is done all down the arms, without the hands of the gymnast leaving the patient's arm when moving along. The gymnast should try

from the beginning to take the proper hold in kneading, so that he holds the arm with the whole hand, that is, with the thumb against the other fingers, and should also try to work evenly with both hands. It has been prescribed that a kneading of the arms should be downward-upward, that is, in a centripetal direction as in massage, but this method is not at all necessary to the purpose for which muscle-kneading is given, especially as it is much more troublesome for the gymnast and



FIG. 27.

he works less easily and effectively downward-upward, so that the movement will not at all be of the same value. Muscle-kneading is given for several purposes, for example, muscle-rheumatism and muscle-inflammation, to strengthen paralyzed muscles, and as a stimulus for enervation of the muscles and for over-exertion, because from direct examination it has been proved that a muscle can perform better work after having received a kneading. Muscle-kneading is therefore used

in dietetic-gymnastics for elderly persons and for patients confined to bed with greatly reduced strength, for long convalescence and in several other states of illness, when a muscle-kneading can, to a great extent, replace the muscular work necessary for the well-being of the body, which invalids are otherwise in want of. Muscle-kneading is further of great importance as a movement promoting blood-circulation in cases of heart-disease. The muscle-kneading described here, and generally given as a Medical Gymnastic movement, cannot be fully said to correspond with petrissage in massage, page 154, which is supposed to have a local effect on a diseased muscle or group of muscles, so that in massage this is lifted as far as possible from the sub-lying muscles and undergoes a much more powerful and persevering manipulation than is used in the Gymnastic muscle-kneading. As a proof that one does not always expect a direct effect upon the muscles, but one more stimulating, is, that one generally speaks of an arm-kneading, leg-kneading etc.

Half-lying leg-muscle-kneading (Zander, J 3)

is done in the same way as arm-muscle-kneading. The gymnast sits on the outside of the patient's leg and puts this up on his nearest knee so that the patient's leg has good support and all muscle-tension ceases. As it is difficult in this position to get hold of the muscles on the under side of the thigh, they can be treated specially, while the patient lies forward on a sofa or plinth.

In **kneading of the neck- and shoulder-muscles** the gymnast places himself behind or at the side of the patient and does the kneading as described above. In kneading the trapezius muscle and the under-lying muscles, a thing which is often required, the gymnast puts his thumb behind and the fingers in front of the muscle. Sawing also is of service in treating this part, of which more will be said later on in the description of this movement.

Abdominal-kneading

is a name which generally comprises several different movements with different effects. Each one might well be described and referred to under its own group, as has been done, but in order to gain clearness, which is particularly important for instruction, all the forms of movement are described here



FIG. 28.

which are used in the direct manipulation of the different parts of the alimentary canal. This method of procedure has, for the reasons above mentioned, been used in the description of some other movements. There are 3 different movement-groups for abdominal treatment, as it is generally called:—

*Kneading,
Shaking and
Stroking*

The meaning of the different movements is given in the

description of the treatment for diseases of the digestive organs.

Abdominal-kneading, Fig. 28 (Zander, H 1),

in the proper sense, is so performed, that the patient takes hook-half-lying position, having the whole of the lower part of the back resting on the low plinth and with good support for the arms and head, so that the abdominal parietes are quite slack. The gymnast sits on the right side of the patient, puts his right hand on the middle of the patient's abdomen, exercises gentle pressure and, rubbing in small circles, kneads the whole of the intestines, after which the gymnast moves his hand out to the right side and the kneading is continued in the direction of the larger intestine along the side-parts of the abdomen. The hand rests all the time close to the wall of the abdomen, so that the intestines are worked upon through the wall of the abdomen, which thus follows the movements of the hand. Several different methods are prescribed to be used for abdominal-kneading, but it is best to work with the whole hand, so that while rubbing circularly, first the wrist, then the radial surface of the hand, the finger-tips and finally the ulnar surface of the hand work alternately. When the abdominal parietes are very thick it will be found advantageous to put the left hand on the right while kneading, by which this becomes stronger. Another way to give a strong abdominal-kneading is, that the gymnast stands in front of the patient and puts both his hands simultaneously, one on either side of the patient's abdomen, and thus performs the kneading with both hands toward each other.

Abdominal-shaking (Zander, F 1)

is done partly as *Stomach pit-shaking* and *Stomach-shaking* to influence the stomach, partly as *Abdominal side-shaking* to influence the larger intestine, partly as *General abdominal-shaking* to influence the alimentary canal in its entirety. All these shakings are given in half-lying position.

Stomach pit-shaking, Fig. 29 (Zander, F 1),

has also been called *Stomach pit-point shaking (localised)* and *Stomach pit-vibration*, the reason for these names being that the movement should be given with a light hand. It is performed, so that the gymnast, who stands in front of and leaning over the patient, places both his hands, turned toward each



FIG. 29.

other, in the pit of the patient's stomach (see fig. 29), just about between the navel and the ensiform process of the sternum. The gymnast exercises slight pressure with the finger-tips which are kept close together, and with slightly crooked middle-fingers, so that all the finger-tips exercise an even and as similarly strong a pressure as possible. The pressure of the fingers pushes the walls of the abdomen in front of them and goes in a bowl-like direction up towards and under the chest while continuous vibration is executed. The movement is repeated several times.

Another manner of giving stomach pit-vibration is, that the gymnast sits on the right side of the patient, puts his right hand in the patient's epigastrium and exercises slight bendings in the hand and finger-joints, while the finger-tips exercise a very light and, to the patient, agreeable vibration, a method which I have successfully used and therefore recommend. Stomach pit-shaking can also be so given, that the gymnast's hand executes shakings from side to side, when the abdominal walls of the patient are pushed with the hand. The shaking, done in this way, begins in the epigastrium and should gradually extend over the whole of the abdomen; this movement is efficacious against diarrhœa.



FIG. 30.

Stomach-shaking, Fig. 30 (Zander, F 1),

is generally called *left underrib-shaking*, which strange name has often been the cause of the movement being wrongly given, in this way, that the gymnast has taken hold of the edge of the patient's chest and shaken it. The object of the movement is to exercise a shaking on the stomach, and this will be the case, if the gymnast stand on the left side of the patient, turned toward his feet, and place both his hands with opened fingers on the patient's abdomen, where the major curvature of the stomach is supposed to be situated, that is, about 2 inches below and internal to the left margin of the chest; the shaking is performed in the direction upward and toward the middle-line with simultaneous firm pressure.

Both stomach pit-shaking and stomach-shaking ought to be given from 5—10 minutes. They alleviate pain in the epigastrium and improve the appetite; the special object of stomach-shaking is also to influence a dilatated stomach.

Abdominal-side-shaking (Zander, F 1)

Abdominal-side-shaking has also been termed lumbar-side-shaking; it is best given, if the patient takes half-lying position; the sitting position, which has also been used, is not so good. The gymnast stands in front and, leaning over the patient, lays both hands on the patient's abdomen, with the finger-tips toward the waist, and shakes from side to side, so that when the one hand goes forward, the other goes backward and so on, while the walls of the abdomen are continuously pushed aside with the hand. This movement is used to advantage in cases of catarrh of the large intestine.

Abdominal-stroking (Zander, J 6)

makes the third group of abdominal movements.

For the sake of completeness *abdominal-side-stroking* or *lumbar-side-stroking* is mentioned here, which consists of strokings from the side-parts of the abdomen in a forward di-

rection; also *transverse-abdominal-stroking*, in which the stroking proceeds from the middle of the abdomen outwards. These strokings, which formerly were oftener employed, used to be given quickly and rather strongly; they are important because they make the peristaltic movement more active, a quality they share with other abdominal movements, which however have a more powerful effect.

Amongst abdominal-strokings *colon-stroking* and *sphincter-stroking* are the most important and most generally used.

Colon-stroking (Zander, J 6)

proceeds from the right iliac fossa along the large intestine in all its course. It has been suggested in many hand-books, that this movement should be given only with the finger-tips all along the intestine, but the stroking will be more powerful and, at the same time, more convenient and less of an exertion to the gymnast, if it be given so that the wrist is used in stroking as far as the ascending colon (finger-tips pointed upward), the whole of the palm of the hand over the transverse colon (finger-tips to left), after which the hand is turned to about right angles, so that during the stroking down over the descending colon the wrist goes first, but in so doing the proper and most powerful stroking is done with the fingers, that follow the intestines right down into the true pelvis. Such a stroking should be powerful, so that it can penetrate deep down, when it has a purely mechanical effect, for, in persons not too stout one can at least feel the lower part of the larger intestine and often the hard fæces in it and even feel, how, in stroking, these are carried forward in the direction they should go. It would therefore probably be best always to let the stroking go in this direction, at any rate along the descending colon. It has been said that as most of the abdominal manipulations only tend to increase the peristaltic movement, it can be of little importance as to which way the stroking is done. That colon stroking and the purely mechanical effect can also possess a reflex action, has never been denied, and the value of the movement is not lessened owing to this double influence.

Anal-massage (Zander, F 1)

is a movement for the treatment of the rectum, of great effect in many affections, such as atony of the intestines, hæmorrhoids, prolapse of the rectum, etc. The name, sphincter-stroking, is not very properly chosen, as shaking and pressing are also included in the movement as much as stroking; the name should, therefore, be exchanged for "anal-massage," which would include these three. The sphincter-ani muscle is not the only sphincter to be met with in the human body.

The movement consists in a treatment of the rectum from the anus, in giving which a rod of hard wood, horn, or the like, can well be employed. The rounded end of the rod is placed against the anus, after which firm pressure and small circular strokings are made to each side alternately with tremble-shaking round the anus. As the perineum is rather yielding, the effect of the pressure is carried high up into the pelvis. The sphincter muscle contracts, when the pressure is exercised on the anus, consequently the rod does not slide in. If an inward treatment of the intestine be desired, a rod as thick as a finger is used. The external anal-massage need not, as a rule, be given on the bare skin but over a shirt or towel etc. Most patients can treat themselves after having received the treatment a few times. The best position is that taken for sacral-beating (fig. 26), possibly with this modification, that the patient leans forward over a table and thus receives good support for the trunk. More will be said as to the importance of anal-massage in the description of the treatment of diseases of the digestive organs.

SAWING

is a movement closely allied to kneading and is given with the ulnar-side of the hand, in the manner implied by the name, that is, as a sawing-movement. The sawing penetrates deeper, if one push aside the skin with the hand, as the movement then

acts on the underlying muscles. If the sawing, on the other hand, be given more on the surface, it acts more on the skin and the subcutaneous tissues.



FIG. 31.

Neck-muscle-sawing,

Fig. 31,

is the only form, in which sawing is now used, but it is here of sufficient importance to make a change in the ordinary muscle kneadings that often occur just on this part of the body and are very tiring. Sawing is, on account of the way in which it is given, less tiring, and yet has a strong effect. Neck-muscle-sawing is therefore much used in giving massage on the neck and shoulder-muscles. (See fig. 31.)

In the Swedish system of Medical Gymnastics, *arm*, *leg*, *head* and *back-sawing* have formerly been given but are now no longer used, as they are fully replaced by other movements.

PRESSING (Zander, F 1)

Pressing was formerly much more used in Swedish Medical Gymnastics than now, and was given with the gymnast's knee, hands or with the finger-tips. Pressing does not deserve to retain its place in the system except as nerve pressing.

Knee-pressing has generally been given so that the gymnast stood behind the patient and supported his back with the knee while the movement was being performed. As no special benefit to the patient can be derived from this method of procedure, and as the gymnast works in a very difficult and uncomfortable position, knee-pressing should be omitted.

Abdominal- and lumbar-pressing have been used while trunk movements, as for example, rolling, raising etc., have been simultaneously given. The pressing then cannot be of other benefit than that the movement becomes stronger through the pressure exercised, that is, it is changed from passive or purely active to a movement of resistance. The pressure is exercised by one or two gymnasts who stand at the side of the patient and place the one hand on the lower part of his abdomen, the other on the lower part of his back. If two gymnasts give this movement, however, the one should place both his hands upon the patient, the other gymnast putting his hands on those of the first, when the pressure will be more even and stronger.

Arm-lean-standing raising with abdominal- and lumbar-pressing

is a movement pretty much used. The patient takes support with his hands on a rib-stool or peg-post and holds his arms stretched all the time the movement goes on. The distance of the feet from the apparatus is thus determined by the length of the arms. The gymnast (one or two) places his hands, for abdominal and lumbar-pressure, as before described. The patient raises himself on his toes, then bends and finally raises himself, that is, he lifts himself so that his legs become fully stretched again, while he carries the trunk in a slight circle forward. During the last phase of this movement the gymnast or gymnasts practises a firm pressure with the hands tow-

ard each other and, at the same time, makes resistance, when the patient raises himself, in consequence of which this movement is a very strong movement of resistance.

It has been considered to be of great effect in cases of constipation; in what way it is difficult to explain. A proper abdominal-kneading has certainly a much stronger effect than simple pressure over the abdomen. But as many of the mus-



FIG. 32.

cles of the arms, legs and trunk are simultaneously set in action in performing the movement in question, it is very much used. It should, however, never be given to others than strong and comparatively healthy persons, and I should like to add, only to men, for I have once observed that this movement was the cause of a rather severe prolapse of the uterus and, at another time, of great pain in the legs to a nervous patient. It is therefore not without reason that the above-mentioned warning is given.

Long-sitting raising with abdominal- and lumbar-pressing

is a movement of principally the same effect as the preceding but one which is rarely used. The patient takes long-sitting position on a high-plinth and receives support for the legs from an over-sitter. A gymnast on either side gives abdominal- and lumbar-pressure in the manner mentioned above. The patient puts his arms over their shoulders and with these the gymnasts can offer resistance in the raising, which, in this movement, takes place from backward-falling.

Another movement, in which pressure is exercised, is described further on, under the name

Knee-down-pressing

The most ordinary form of movement, in which pressure is given, is

Nerve-pressing (Zander, F 1),

which is given in many different ways for different purposes, but it can be said to have principally a stimulating influence.

On the whole a distinction can be made between a

general nerve-pressing, as it used to be given by Swedish Medical gymnasts when no special nerve is treated, and a more

local nerve-pressing, when the special nerve to be treated is found, and pressing exercised upon it.

Such a general nerve-pressing has been given on the extremities in cases of paralysis and other affections, when the

extremity in question is so placed that it lies horizontally and is quite passive; the gymnast puts both his hands at once round the extremity, exercising nerve-pressing in such a way, that the somewhat separated and bent finger-tips make the pressing while a slight tremble-shaking is also given. As the gymnast repeats this pressing several times, each point of the nerve is met by it, and the movement will thus be a nerve-pressing, but still more a kind of muscle-kneading. The movement is very agreeable to the patient, but unnecessarily tiring to the gymnast, so that in most cases it should be replaced by muscle-kneading; nerve-pressing on the extremities is generally given as

Yard-sitting arm nerve-pressing and

Half-lying leg-nerve-pressing.



FIG. 33.

Back nerve-pressing, Fig. 33 (Zander, F 1),

is a form of general nerve-pressing, considerably used. It is performed in arm-lean-standing, arm-lean-sitting or forward-lying position and is given against fatigue and ache in the muscles of the back, muscle inflammation and paralysis, for scoliosis, chlorosis etc. In giving back-nerve-pressing the gymnast places one hand on either side of the patient's spine and makes pressure with the tips of the three middle fingers as a kind of boring deep down while executing at the same time a trembling from side to side with the hand, and this is continued from the top all down the back several times.

Pressing above the pubis

is a form of general nerve-pressing, which has been used for diseases of the urinary-bladder, uterine complaints and prolapsus ani (HARTELIUS) in such a way, that the gymnast has exercised pressure down in the pelvis with his fingers. The palms of the hands have been kept turned toward each other and the pressing has not been intended to affect any special organ, but the plexus hypogastrici inferiores. As I have used a modification of this treatment in diseased conditions of the urinary bladder, but worked out my own method which considerably differs from that described by BRANTING and HARTELIUS, I will explain it here. I include the different movements, which are used here, under the general designation:—

Bladder-treatment or bladder-massage. Fig. 34 (Zander, F 1)

I usually commence the treatment with a "massage à friction" above the bladder-region, using the whole of the palmar surface of the hand and with tolerably firm pressure down towards the pelvis. To older persons, who, along with diseases of the bladder, are troubled with constipation, which is frequently the case, a thorough abdominal-kneading is also given, because I have remarked that a normal purgation advanta-

geously influences the bladder and its functions and diseases. During this treatment the patient should lie in hook-half-lying position and quite passive; then he must sit up in a somewhat forward-lean position with good side-support for his arms so that the abdominal muscles can be quite slack; if he be thin, he must take a still more forward-lean position; if he be stout, one more backward-lean, but always with good arm-support. The placing of the patient in the following manipulations is of considerable importance, because on it depends, to a great



FIG. 34.

extent, whether the bladder is accessible or not to massage. The gymnast, who should sit on a somewhat lower stool in front of and turned toward his patient, puts his hands, with the palms of the hands turned downward and all the fingers close together, against the wall of the patient's abdomen from 1—2 inches above the upper edge of the pelvis, in stout persons a little higher than in thin. The gymnast then slowly and lightly pushes the walls of the abdomen forward with his hands—putting aside the parts of the intestines that lie in the way—in an arch-like direction around the bladder, after which a firm pressure is made with tremble-shaking, so that the blad-

der, as it were, is pressed down into the pelvis and at the same time toward the symphysis pubis. The pressure and tremble-shaking are continued in this manner several times with short intervals for rest. The treatment is rather tiring to the gymnast but should last 5—10 minutes. It does not exactly cause the patient pain, but is far from agreeable, not even to healthy persons; the pressure should, however, be given so strongly that a desire both to make water and to empty the bowels is experienced, which to a certain extent should prove that this movement must be effective. The gymnast must not omit to tell the patient that his abdominal muscles will be sore during the first few days of the treatment. As, however, in stout persons, it is difficult to work upon the bladder through the walls of the abdomen, it can better be reached from the perineum or through the rectum.

For **perineal-massage**, formerly called *perineal-shaking*, the patient should take hook-half-lying position with well drawn-up legs and good support for the feet, so that he is quite passive. The hands, with the palms turned toward each other and finger-tips facing the perineum, then give a thorough tremble-shaking. LIEDBECK's vibrator or other shaking machine is very suitable for the shakings. This "perineal-shaking" is much used by old Swedish Medical gymnasts, and I have also tried it but always along with other movements, but I have gradually discontinued perineal-massage, because, in most cases, it is unnecessary and besides, at least for younger persons, unsuitable, as it may possibly produce sexual irritation, which is not the case with other movements that are used for the bladder.

Perineal-shaking can, however, advantageously be used, when the patient treats himself, as for example in prostaticism, when the patient takes sitting-position, puts his left hand toward the perineum with the fingers pointing backward, after which shakings, forward-backward, and pressure toward the pelvis can easily be given.

Treatment of the bladder per rectum, Zander, F I, is best given with a rod-shaped instrument; in this case too LIEDBECK's vibrator is suitable. Massage of the prostate is given in the same manner or with the fore-finger placed in the rectum. This last-named method is the most agreeable to the patient and the only one that can be tolerated in patients with a tender prostate, but it is more disagreeable and tiring to the gymnast, so that it should only seldom be employed.

In some cases, I have observed, that the best results have been gained by using all the different methods at the same time.

The effects of bladder-massage are described in connection with the treatment of affections of this region.

I have mentioned before that in the local nerve-pressing a particular nerve is found for treatment; *nerve-pressing* can either be one

1) *quickly passing*, as when one snaps a string, which is often repeated, or

2) *continual for minutes or hours*.

Cases of illness treated will be described in a special chapter together with nervous diseases. It will be sufficient to say here that, in the quickly-passing nerve-pressing, reaction has been produced in such affections, when an electric irritation has not succeeded, and that, on the other hand, a continual nerve-pressing has shown good results in cases of muscle-tremor and trembling of different kinds.

SHAKING. VIBRATION (Zander, F 1).

Shaking is a form of movement much used. It has been considered by Swedish gymnasts to have a stimulating effect on the nervous-system; some shaking-movements diminish an increased heart-activity, probably in a reflex manner. Shaking-movements are further of importance in cases of catarrh as they loosen the mucus from the surface of the mucous membrane.

P. H. LING has already declared on several occasions, that shakings can advantageously be given with machines, and many kinds of these have also been constructed, called Percussors, Concussors, Vibrators. No better instance than this can be given, if one wish to prove the superiority of Medical-Mechanic Gymnastics over the manual, because however lightly, well and agreeably a shaking can be given manually, it must still be acknowledged, that a shaking performed in this manner can not be so even and continuous as with machines. There are two different groups of shaking-movements to be distinguished, namely:—

1) **shaking proper**, when an actual shaking in the real sense of the word is performed on the part of body in question;

2) **vibration, tremble-shaking or trembling**, which is a lesser and weaker movement, so that the part of body in question does not undergo any real shaking, but remains at rest, whilst a shaking *upon* the same is made.

These two kinds of movement are in reality so different as to the manner of performing them, that they could reasonably be looked upon as two separate movements; there are besides several forms of transition between them, so that a number of denominations are used, such as *tremble-pressing*, *point-shaking*, etc.

Yard-sitting arm-shaking (Zander, F 1; see Fig. 69 and page 124)

Half-lying leg-shaking (Zander, F 1)

are given thus, that the gymnast takes hold of the patient's hand or foot and shakes the extremity, but this is very tiring to the gymnast. As the therapeutic value of such a movement is far from clear and cannot be of great importance, it ought to be altogether replaced by muscle-kneading, hacking or nerve-pressing.

Chest-shaking (Zander, F 1)

is, on the contrary, a movement of the greatest importance, in cases of heart and lung diseases. Chest-shaking, in its effect on the lungs, resembles chest-clapping in this way, that it furthers expectoration and makes the breathing deeper and fuller. It is given in a standing or half-lying position.



FIG. 35.

Heave-grasp-standing chest-tremble-shaking.

Fig. 35 (Zander, F 1)

The patient is placed between a couple of ropes, poles or in an open door in the position illustrated; the gymnast stands in front and, putting his hands on the patient's back, moves them in the direction outward-forward-downward while all the time tremble-shaking or tremble-pressing (see Fig. 35).

When the movement commences on the sides of the chest it is called

Side-tremble-pressing (= shaking) (Zander, F 1)

The patient takes a deep breath before the movement begins, so that this is given whilst the patient is exhaling and is so ordered that the lower side-parts of the chest are pressed together just at the end of expiration. This method of proceeding should be carefully observed, and the gymnast should be particular to see that chest-tremble-shaking or side-tremble-pressing does not take place during inspiration.

The movement has a specific influence on emphysema of the lungs, when, as is known, expiration, in most cases, is rendered more difficult. It also reduces an increased heart-activity as also do the following movements, which are therefore frequently used for this object.

Heave-grasp-standing back-tremble-shaking and

Arm-lean-standing back-tremble-shaking (Zander, F 1).

The gymnast standing behind the patient, puts both his hands upon each other in the middle of the patient's back and makes repeated and continual shakings. This movement should also be given during expiration.

Half-lying chest-lift-shaking.

Fig. 36 (Zander, F 1)

The gymnast, standing at the patient's side, puts his hands upon either side of his back, lifts him, and, at the same time, tremble-shakes, whilst his, the gymnast's, hands go down over the back and finally forward over the lower part of the sides of the chest.

The movement is rather tiring to the gymnast, but, on the other hand, is very agreeable to the patient, and is much used, as it is principally intended for patients confined to bed with diseases of the heart or lungs and is greatly appreciated by such persons. It is also the weakest respiratory movement of all used in Medical Gymnastics.



FIG. 36.

Half-lying heart-tremble-shaking, see page 49

Abdominal-shaking, see pages 59—61

Shaking-movements have also been used for the throat and nose, in both cases intended to influence catarrh, the latter also for nose-bleeding.

Larynx-shaking, Fig. 37, and

Pharynx-shaking (Zander, F 1)

are given in this manner. The patient takes a sitting position, and the gymnast stands in front with the thumb and fore-finger of the one hand holding the larynx or upper part of the throat respectively, after which the shaking is given from side to side, alternately with strokings down over the throat. Quite as good a grip is obtained if the larynx be held between the fore-and-middle fingers. The gymnast should support the crown of the patient's head with the hand that does not perform the movement.

Besides the above mentioned influence, shaking of the larynx certainly improves the condition, in cases of atony of the laryngeal muscles caused by prolonged fevers and severe anæmia. I shall speak later on of cases which have been treated and I am sure that, the mechanical treatment here also



FIG. 37.

vindicates its place, when employed in suitable cases. But, on the other hand, to practise inner massage of the throat with the finger or an instrument, so far as one can judge at present, should seldom, if ever, be attempted. At least, gymnasts would act wisely in leaving this kind of treatment to specialists for diseases of the throat.

Nose-root-shaking (Zander, F 1)

is carried out in the same way as the above described shakings, with the thumb on one side of the nose, the fore-and-middle fingers on the other. The shaking goes from the root of the nose downward several times and has often been given together with simultaneous back-upraising. The value of this treatment of the nose is extremely doubtful, but is certainly not harmful. That gymnasts, who have no other means than

gymnastics at their disposal, have, of course, tried this on all occasions, is quite natural.

All these minor shaking-movements are easily given with LIEDBECK's vibrator or with other shaking-machines.

Under-kidney-tremble-shaking

is used in cases of floating kidney. It is known, that a considerable alleviation, or even a temporary cessation of very severe symptoms, is gained as soon as the floating kidney has been moved back to its right place. The first movement of the gymnastic treatment consists then, in the patient taking hook-half-lying position and the replacement of the kidney. After this the gymnast executes the manual movements which ought to be the essential part of the treatment and which consist in a deep-going and continuous tremble-shaking up towards the replaced kidney. This movement is called by gymnasts, under-kidney-tremble-shaking.

STROKING (Zander, J 1)

is executed in different ways for different objects. Three different kinds of effect from stroking can be distinguished, for example:—

1) **A mechanical effect** when stroking is employed for treatment of the larger intestine in cases of constipation, when the colon-stroking should be given strongly and act deeply. Compare page 62.

2) **A reflex effect** powerfully is intended in giving a transverse abdominal stroking which is then given more quickly and lightly than in the preceding case. Compare page 61.

3) **A sedative effect**, when the stroking is given lightly, superficially and slowly, as a finish to other movements, for example, hacking, clapping, kneading. Here the object should be to make the stroking as agreeable to the patient as possible; in so doing much of the pain and unpleasantness which the above-mentioned movements sometimes necessarily have caused can be alleviated or diminished, if they be given strongly enough to be of effect.

Sitting head-stroking

is generally given as a finish to head-hacking, page 46, but can well be used as an independent treatment for several nervous conditions, megrim, sleeplessness, etc. The stroking should here be done with the flat side of the hands from the forehead and crown of the head down over the head and throat. If a soothing effect be desired, as in cases of sleeplessness, the stroking can be continued over the arms and trunk but always starting from the head. The stroking, under such circumstances, should become gradually slower and at the same time lighter so that at last the patient is scarcely touched. This may be called magnetism or hypnotism, according to taste; the name is of little consequence, since the treatment has, in many instances, proved to be effectual.

Half-lying heart-stroking

is mentioned on page 49.

Yard-sitting arm-stroking and Half-lying leg-stroking

are generally given in such a manner, that the gymnast rather quickly, and, at the same time, powerfully performs the stroking with opened fingers from the proximal part of the extremities to the distal. The stroking is done simultaneously with both hands, but almost solely with the finger-tips. Such a stroking has a stimulating effect and ought also to produce a contraction in the capillary system of the skin.

Arm-lean-standing or -sitting back-stroking (Zander, J 5)

is done with the flat side of the whole hand on both sides of the spine and with one hand at a time from top to bottom as a finishing-movement after back-hacking, clapping and back-nerve-pressing.

There is a slight difference in giving back-stroking in

Hips-firm-sitting back-raising with back-stroking

See further on, under the head of *Raising*, and Fig. 66.

gymnastics at their disposal, have, of course, tried this on all occasions, is quite natural.

All these minor shaking-movements are easily given with LIEBCK's vibrator or with other shaking-machines.

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is used in cases of floating kidney. It is known, that a considerable alleviation, or even a temporary cessation of very severe symptoms, is gained as soon as the floating kidney has been moved back to its right place. The first movement of the gymnastic treatment consists then, in the patient taking hook-half-lying position and the replacement of the kidney. After this the gymnast executes the manual movements which ought to be the essential part of the treatment and which consist in a deep-going and continuous tremble-shaking up towards the replaced kidney. This movement is called by gymnasts, under-kidney-tremble-shaking.

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Knee-back-stroking

has formerly been used and has been so used, that the gymnast, standing behind his patient, performed the stroking down his back, whilst the patient has at the same time executed other movements, for example: double arm-flexion with resistance. This movement is also a kind of chest-expansion; it is extremely unpleasant to the gymnast and can easily be replaced by other movements.

Abdominal- and intestinal-strokings (Zander, J 6)

see pages 61 and 62.

The above described gymnastic strokings have nothing in common with the effleurage of massage and for this reason, that the strokings are often given in a centrifugal direction and often over the clothes, so that they are not intended to produce a direct influence on the venous and lymph stream, but rather an effect upon the nerves of the skin.

FRICTION (Zander, J)

Stroking has rather often been termed friction, especially when it has followed a special nerve-root; it generally proceeds in a centrifugal direction. Even P. H. LING speaks of friction performed with different degrees of strength. *Nerve-frictions* have recently become fashionable, and some gymnasts consider them to play so important a part in Swedish gymnastics, that these nerve-frictions alone can cure almost everything, whereas other gymnastic movements are only of minor importance. Nerve-frictions are given with the finger-tips or with the nails of the forefinger and thumb placed against each other, or else with the thumb-nail alone, when some special nerve shall be treated, as for example, n. occipitalis. In treating the part of the head which is covered with hair, a treatment which not

infrequently occurs, a friction with the dorsal surface of all the finger-nails, can advantageously be given in this way, that the strokings go from the fore-head over the crown and sides of the head in a backward direction (see Fig. 38). The nails glide through the hair better than the finger-tips and the treatment can be given more strongly, without causing the patient pain. As I have seen good results from this treatment in rheumatic cephalalgia and head-neuralgia, I give the following as a special movement:—

Sitting head-nerve-friction, Fig. 38



FIG. 38.

Nerve-frictions, performed on other parts of the body, are as agreeable as head-nerve-friction, and certainly possess a stimulating influence, but as the therapeutic value is not yet satisfactorily explained, I shall not class nerve-frictions on the extremities and trunk as special forms of movement. Ordinary nerve-massage and nerve pressings could easily replace nerve-frictions.

LIFTING

Lifting is used as a respiratory movement in the form of chest-lifting, generally for more delicate patients with heart-disease and the more severe diseases of the chest. The gym-



FIG. 39.

nast stands behind the patient and puts the arms under his arm-pit from behind, if the patient sit on a high plinth (see fig. 39). or from the front if he sit on an ordinary chair (see fig. 40) but always observing that a real lifting of his chest takes place, so that the lifting is not practised on his arms. If chest-lifting is to be done in different planes, as it is called, the grasp from in front is better. The patient is then turned to either side between the liftings, generally so that the commencement is from the one side, after which a twisting to the opposite side gradually follows, so that after 6 or 8

liftings he is turned to the other side. This method of chest-lifting is advantageous in cases of a sinking-in of the one half of the chest, for example, after a pleural exudation, and the same course is considered of importance in cases of emphysema, because the lower parts of the lungs are more completely filled and emptied. The most usual forms of chest-lifting are thus



FIG. 40.

Sitting chest-lifting, Fig. 39 (Zander, E 6), and

Sitting chest-lifting in different planes, Fig. 40

A question of the greatest importance is: how should chest-lifting be given with regard to the respiration? It is clear, that the lifting should occur with the inspiration, but, in order that this shall be as deep as possible, it would be best for the patient to begin inspiration before the lifting commences, so that in the middle of the movement he has already completed the inspiration. By the continued lifting more air streams in, = complementary-air, and the lungs have become

filled. I have often had occasion to observe that, by such a treatment, patients with feeble breathing can be helped, not only during the treatment, but that they can also be taught to make their respiration in the intervals fuller and deeper.

In emphysema of the lungs, chest-lifting is succeeded by a side-tremble-pressing during the expiration of the patient. Compare page 75.

Movements in which lifting is included, are used according to C. BRANDT's gymnastic method, for the uterus in cases of prolapse of the uterus, and on the sigmoid flexure of the colon in cases of a prolapse of the rectum.

EXPANSION

is only used as chest-expansion; it is a specially good respiratory-movement and is most often given as

Heave-sitting chest-expansion, Fig. 41 (Zander, E 6)

The gymnast, thus standing behind the patient, takes hold, with his hands, of the lower part of the patient's upper arms and gives chest-expansion by drawing the arms in a direction backward and a little upward. Here, as in chest-lifting, the gymnast supports the patient's back with his own trunk, and it is often well to use a small cushion between, to increase the expansion of the chest. That inspiration should take place simultaneously with chest-expansion and that this should keep the same time as a slow respiration, scarcely requires to be mentioned. Chest-expansion is much easier for the gymnast to give than chest-lifting, although perhaps not quite so agreeable to the patient as the latter. As chest-expansion works more strongly it is much used as the first and last movement of a day's treatment so that it has always been a rule to begin and finish a Medical Gymnastic treatment with a respiratory-move-

ment. Chest-expansion is also used in all cases where the object is to raise the chest, as in flat-chest, round-back or lateral curvature of the spine.



FIG. 41.

Heave-grasp-standing chest-expansion (Zander, E 6)

The gymnast places both his hands on the middle of the patient's back and produces a strong expansion of his chest by making a pressure or pushing in the direction forward and somewhat upward. The movement is also given as

Stretch-grasp-standing chest-expansion (Zander, E 6)

These movements, as all other passive respiratory-movements, should be repeated 10 or 12 times.

HEAVING

Heaving properly means

- 1) the lifting of the body with the help of the arms,
but in another sense as
- 2) the lifting of the arms to a perpendicular position,
and further
- 3) the lifting of the body to toe-heaving.

Stretch-hanging-heaving, see fig. 21,

can be performed on a boom, ladder or trapeze; it is a very powerful movement, which can be regarded as Pedagogical rather than Medical Gymnastics, but this movement is one that is preferably used by children and can often be of good service in Medical Gymnastics, wherefore it is included here.

The movement entails great exertion, if the heaving is to be done without help. If the muscles of the arms be not well developed and practised, it will either be impossible to execute the movement, or else a very faulty and injurious position will result in this way, that, the head is bent forward, the chest is compressed, the legs are drawn-up towards the abdomen or carried far behind, etc. With only slight help, as the lifting of the hips or legs (compare fig. 21), even very weak patients can perform the heaving. I frequently prescribe heaving as

Stretch-hanging double arm-heaving with leg-support

The gymnast must then observe, that the specified bearing for the fundamental position, page 22, be carefully taken, that the distance between the hands is greater than the shoulder-breadth, and that the heaving is done so far that the upper arms and forearms, at the end of the movement, form right angles, and that they are continually kept in the frontal

plane. Performed in this manner, this movement is of considerable prophylactic importance as regards the normal development of the chest and spine, and not of less therapeutic importance when it is a question of curing a practically deformed, a flat, compressed or a narrow chest, round back or the first stage of curvature of the spine. Heaving is also a good movement against forward-bent-head, hanging shoulders, and what generally is called a "bad bodily position."

A *boom* or *trapeze* should be found and used in every home, where there are children to be educated. At the same time that I prescribe these simple apparatus I must express my disapproval of the so-called ring-exercises (in freely hanging ropes with rings at either lower end for the hands to hold) because it is just through these that defective bodily bearing is produced, that I have explained as being injurious, because the hands are carried to each other. Sad enough to say the gymnastic hand-books commonly used abroad approve of these apparatus.

Standing double arm-heaving

is the most generally used of all arm-movements.

Standing double arm-heaving forward-upward outward-downward

is so performed, that the arms, well stretched, are carried forward-upward with the hands separated from each other a little more than a shoulder-breadth, while the palms of the hands are turned toward each other; when the arms are fully stretched upward, they are carried straight out in a downward direction, in doing which the palms of the hands are turned upward, until the hands come into horizontal plane when they are twisted so that the palms are turned downward.

This movement, which is an excellent respiratory-movement, should be done so slowly, that a deep inspiration takes place during the heaving, a deep expiration in sinking and it

is completed without interruption from beginning to end, after which a short pause, as occurs in quiet breathing. Besides being a good respiratory movement it is also a good "adjusting-movement" and is therefore used to advantage as a finish to other movements. So for example, I let most patients, who are treated for curvature of the spine, do double-arm-heaving 6 to 8 times after every other movement.

**Standing double arm-heaving outward-upward and
outward-downward,**

usually termed shortly

*Arm-heaving outward,
Arm-lifting outward, or
Arm-carrying outward.*

It is used, like the preceding, as a respiratory movement, when the same directions concerning breathing should hold good. This movement is easier to perform than the preceding and is the easiest active respiratory movement, particularly if the arms be not fully stretched upward.

For patients with heart-disease it may be quite exertion enough to carry the arms outward to the horizontal plane, but if the inspiration take place simultaneously with the heaving and the expiration with the sinking, the movement is even then of considerable importance.

Toe-heaving (heels raising)

is generally performed as

Hips-firm-standing heels-raising

alternately from standing fundamental position and close-standing position, but always observing that the heels are continually close together; thus also during the heaving and the time when the feet remain in heave position.

FLEXION and EXTENSION

Many other movements could also be classed under this head such as: Carrying, Swinging, Drawing, Abduction, Adduction, Raising, Falling and Ringing, for all are similar in



FIG. 42.

that a flexion or extension, abduction or adduction is made in some part of the body. That abduction and adduction are often termed flexion and extension must be looked upon as an irregularity in Gymnastic Terminology. They refer to side flexions of the head and trunk and also flexion of the arms; so for example, the ordinary gymnastic "arm-flexion and -extension" is really an abduction and adduction in the shoulder-joint. Any change, however, in the terminology is here unnecessary as the terms have already been long used and are easily understood.

Half-lying double arm-flexion and -extension, Fig. 42 (Zander, A 3, A 4),

Sit-lying double arm-flexion and -extension, Fig. 43,

Leg-forward-lying double arm-flexion and -extension

are all used in Medical Gymnastics, generally as movements of resistance, when all the bending and stretching muscles of the arms are brought into action. If the desire be to stretch the spine, as, for example, in cases of curvature of the spine, resistance is only made in the bending.



FIG. 43.

The gymnast stands, in the two first mentioned movements, behind the patient; in the last, in front. They hold each other by the hands and the patient performs the movement all the time, while the gymnast makes resistance, which should be strongest in the middle of the movement, weaker at the beginning and end. The gymnast must conduct the movement so that the patient's arms are kept all the time in the frontal plane of the body.

Arm-flexion and -extension, performed as an active movement, and borrowed from Pedagogical Gymnastics, is also somewhat often used in Medical Gymnastics and has

there the same name. (For the sake of abbreviation, only "extension.")

Double arm-extension upward, outward, forward, backward, downward (Zander, A 2)

Single arm-extension with resistance is used to correct C-formed curvatures of the spine and then usually as:—

Stoop-stride-sitting (right or left) arm-extension, Fig. 44 (Zander, A 4)



FIG. 44.

Ride-sitting (right or left) arm-extension (Zander, A 4) or

Leg-lean-standing (right or left) arm-extension

Single arm- and leg-extension is also used as a "holding-movement" in spring-sitting holding, to correct curvatures of the spine, more of which will be said in connection with the description of the treatment.

Arm-flexion and -extension in its real signification, is, in gymnastic language named

Arm-carrying forward-backward ;

when the movement is quickly performed it is also named

Arm-swinging forward-backward

This movement is generally performed as an *active* one, but is not much used; this together with other movements in the shoulder joint can help to overcome stiffness. For this object flexion and extension can be used with advantage as a passive movement in this way, that the patient's hand is taken hold of and, with his arm, such movements are performed as in sawing.

Forearm-flexion and -extension (Zander, A 9; A 10)

FIG. 45.

In the arm-flexions and -extensions described on page 90, not only the shoulder-joint but also the elbow-joint is concerned. If, as is often necessary, with flexion and extension, one specially wish to influence the elbow-joint, the movement

should be performed with the arm well supported (see fig. 45), against a table, wall etc. Flexion and extension of the elbow-joint is given as an active or passive movement, or one of resistance; as passive it is best given in the position shown in fig. 45; as a movement of resistance generally, so that the patient stands with his back against a wall, keeping the upper arms all the time supported against it, while the gymnast stands in front and, with his hands, practises resistance on the patient's hands while the latter performs flexion and extension of the forearms.

Wrist-flexion and -extension, Fig. 46 (Zander, A 11), is generally called bending, to whichever side it may be done. By calling it



FIG. 46.

palmar-flexion, dorsal-flexion (Zander, E 2, passive),
radial-flexion, ulnar-flexion (Zander, E 3, passive),
full clearness is gained. These movements are best performed in this manner, that the patient's forearm rests on a table, so

that the wrist reaches over the edge of the same; the gymnast, with one hand, takes hold of the patient's forearm, and, with the other, his hand (see fig. 46) and he can thus give proper strength to the movement.

Finger-flexion and -extension, Fig. 47 (Zander, A 12; E 4, passive)

Flexion and extension can be done in all the finger-joints. The thumb joints are treated alone, but in the other four fin-



FIG. 47.

gers, flexion and extension can be done in all the joints at once, even when the movement is to be passive. This takes place, best in this way, that if, for example, the patient's right hand is to be treated, the gymnast holds the same fixed with his left hand, while he puts the palmar side of his right hand on the dorsal surface of the patient's fingers, with which, in this position, he easily performs flexion and extension, see fig. 47.

Hipjoint-flexion and -extension

is done in various ways and under different names. It is called:

a) **High arm-lean-standing leg-swinging forward-backward,**

when the movement is performed quickly, either actively or passively; the patient, in both cases, is placed at the peg-post or other apparatus, that can serve as a support for the hands, and standing on a foot-stool, by the side of which the leg is swung (compare fig. 58);

b) **Half-lying leg-flexion and -extension** (Zander, B 3; B 4) is performed as a movement of resistance generally together with leg-rolling and with the same grip as in that movement (see fig. 79), when all the joints of the leg are exercised. The movement is oftenest performed with one leg at a time. Sometimes as

Stretch-lying double leg-flexion and -extension (Zander, B 3; B 4)

when coordinate movements are in question, especially when the treatment concerns children.

If resistance be offered above the knee, the hip-joint alone is in question. The movement is then called

c) **Knee-up-drawing and -down-pressing**

The last-named movement is generally performed as

Half-lying knee-up-drawing and -down-pressing

and as

Stretch-grasp-standing knee-up-drawing and -down-pressing (Zander, B 1; B 2),

in the latter case with the back supported against ribstool or peg-post. The movement is most frequently given for "depleting" in diseases of the viscera of the abdomen and pelvis; it is considered effectual against constipation. The same influence is possessed by

d) **High arm-lean-standing leg backward-drawing** (Zander, B 1; B 2),

which is always given as a movement of resistance (compare fig. 58).

e) **Standing knee-flexion and -extension,**

which is performed as purely active, or with support for the wrist with slight resistance in the latter case as

Stretch-standing knee-flexion and -extension
and

Standing alternate knee-upward-bending

Here all the joints of the legs are involved. The last-named movement is always purely active.

Knee-flexion and -extension (Zander, B 3; B 4)

is performed actively, generally in hips-firm-standing position and with heels-raising (fig. 12); it is often shortly called *curtsy-ing*. The flexion is done until either the upper and lower legs form right angles at the knee-joints, or continued as far as the flexion is possible.

Children, as a rule, require support in order to be able to do the movement properly; it is then best done as

Stretch-standing knee-flexion and -extension with
wrist-support,

performed either as a purely active or with so much resistance in both flexion and extension that the movement becomes powerful and correct in form.

As a passive movement, knee-flexion and extension is done in the half-lying position. It is often given as a movement of resistance and with one leg at a time as

Half-lying knee-flexion and -extension, Fig. 48 (Zander, B 9; B 10),

when the gymnast sits at the side of the patient, and places his upper leg over his own knee in the way shown in Fig. 48.



FIG. 48.

During the performance of the movement the gymnast must be careful to observe that the flexion and extension take place in the plane of the leg, so that no drawing outward of the lower leg arises, which is a common mistake. Resistance is made on the lowest part of the leg, by the gymnast putting his hand so, that his fingers lie on the inside of the leg and his thumb on the outside. By placing the hands in this manner, they need only be moved slightly in going from flexion to extension and vice versa.

Half-sitting knee-flexion and -extension (Zander, B 9; B 10)

is performed over the boom, as fig. 49 shows, and with the same grip as that explained for the preceding movement.



FIG. 49.

Sit-lying double knee-flexion and -extension

is used with other movements, when the object is to give co-ordinate movements.

Half-lying double foot-flexion and -extension (Zander, B 11)

is oftenest given together with foot-rolling, best so, that the gymnast, who sits at the side of the patient, puts up the latter's outstretched leg on his knee, see fig. 80, and takes hold of the front part of the foot with his palms turned toward each other. This grip need not be changed whether the foot-flexion and extension be given as a passive movement or as one of resistance.

High arm-lean-standing foot-flexion and -extension

The patient supports his one heel on the stool, on which he stands, while the other part of his foot is kept outside the edge of the same. The gymnast sits to the outer side of the leg and offers resistance on the fore-part of the foot.

With heels-raising and accompanying sinking the movement becomes active. Compare page 88.

Head-flexion (Zander, C 10)

in the direction forward-backward and to the sides is an active movement in free-standing Gymnastics. (See "*Free-standing movements*.") In flexion forward-backward remember that the movement takes place in the vertebral column of the neck in its entirety, not in the atlanto-occipital-joint, i. e. avoiding the movement that arises when the chin is poked forward, while the neck is kept still. Head side-flexion, generally called head-lateral-falling, should be done as a proper flexion without twisting.

For stiffness of the muscles and joints of the neck, which often occurs in a torticollis rheumatica, the above-named movements are given as passive, when the patient is best fixed, lying on his back on a high plinth and with support for his shoulders as fig. 71 shows. The gymnast sits or stands behind and takes hold of the sides of the patient's head, while the movements are given as:—

Lying head-flexion forward-backward

and

Lying head-side-flexion (Zander, C 10).

The flexion backward is often performed with resistance and is then generally called *neck-raising*. It is used principally to straighten the region of the neck in cases

of "round shoulders" and "hanging-head," but can also advantageously be given for scoliosis, when neck-raising, in those positions usually chosen, is meant to stretch the spine in its entirety.

Arm-lean-standing head-flexion backward (Zander, C 10),

Stretch-hanging head-flexion backward and

Stretch leg-forward-lying head-flexion backward,

Fig. 50,



• FIG. 50.

are the most ordinary movements. In the two first mentioned the gymnast puts his one hand with opened fingers against the back of the patient's head and in this manner offers resistance for head-flexion backward, when the whole of the spine is stretched. In stretch-forward-lying position the patient takes support on the gymnast's shoulders, as fig. 50 shows, while the latter offers resistance with one or with both hands.

Crutch-standing head-side-flexion, Fig. 51 (Zander, C 10),
or
Crutch-standing head-side-falling



FIG. 51.

The position fixes the trunk particularly well, and the gymnast, who stands behind his patient, can, with one hand, easily offer suitable resistance, while with the other he conducts the movement in the proper direction. The movement is used for scoliosis in the cervical or dorso-cervical-region.

Trunk-flexions forward-backward and to either side are performed as active movements in free-standing gymnastics, see further on. Trunk-flexion forward-backward can take place in the joints of the spine alone, in the hip-joints alone, or in both simultaneously. In

Hips-firm standing trunk-flexion forward (Zander, C 5)

the flexion is made in the hip-joints, while the whole of the spine is kept straight, the gaze throughout the movement remains directed forward, and stoop-standing position arises. Compare fig. 14.

Stretch-standing trunk-flexion forward (Zander, C 5)

The flexion begins in the hip-joints and is then continued in the lower part of the vertebral column of the back and by degrees to the higher parts, so that the flexion takes place last in the neck. The stretching upward goes in an opposite direction, beginning in the neck etc. downward. The arms and head move with each other all the time.

Stretch arm-lean-standing backward-flexion with wrist-support and pressure in back

This movement is used for "round shoulders" and is so performed, that two gymnasts place themselves behind, and at the side of the patient, with one hand holding his wrist and regulating the backward-flexion, and with the other placed in the middle of the patient's back in order to offer resistance to the movement.

The flexion backward takes place principally in the upper part of the spine. Compare fig. 15, backward-bend-standing position.

In these trunk-movements care should be generally taken, that the patient does not overdo them, as then they are of more harm than good. A mistake frequently made in backward-flexion is, that the knees are bent and the abdomen is protruded.

Close-standing side-flexion (Zander, C 6)

The flexion begins even here in the lower part of the spine and continues upward, so that the neck is bent last (com-

pare fig. 16); the raising proceeds in the opposite direction, until the body stands upright, when the flexion takes place on the other side, etc. By moving the hands along the sides, the movement is, as it were, lead i. e. one avoids putting forward the shoulder or the hip toward which the flexion tends, a mistake which is generally committed, and thus a pure side-flexion is obtained.

**High-ride sitting side-flexion, fig. 52, and
Standing side-flexion at boom, fig. 53 (Zander, C 6),**



FIG. 52.

is given as a movement of resistance for scoliosis and in cases of a sinking-in of the one half of the chest. To strengthen these movements side-suspension on boom is used (see fig. 83).

The first-mentioned of these movements is much used for C-shaped scoliosis. The patient takes high-ride-sitting position, with well fixed knees and feet. The gymnast stands

behind, puts his one hand on the back-outer-side of the patient's chest and in this way offers resistance to side-flexion, while, with the other hand, which he places on the patient's other shoulder or arm (see fig. 52) he conducts the side-flexion in the right direction, which method of procedure will be further described in connection with the treatment for curvatures of the spine.



FIG. 53.

If side-flexion be performed at the boom, to influence curvature of the spine, the boom forms the fixed point around which the flexion takes place, so the gymnast does not offer any resistance but only sees that the movement is performed as accurately and as powerfully as possible.

Walk side lean-standing side-flexion, fig. 53 (Zander, C 6), with support placed on the hip, as shown in fig. 53, is a powerful and graceful trunk-movement, borrowed from Pedagogical Gymnastics. In treating curvatures of the spine side-flexions of the trunk are frequently used in forward-

lying and leg-forward-lying positions, because the lumbar-region of the spine is so advantageously influenced in this position.

Stretch leg-forward-lying side-flexion, Fig. 54 (Zander, L 3; L 5)

The position is taken, as has before been described (page 41). The patient keeps his hands on the gymnast's shoulders, as shown in fig. 54, while the latter takes a good hold of the



FIG. 54.

patient's shoulders and gradually turns his trunk over to the side as far as possible. Counter-pressure on the greatest convexity of the spinal curvature is exercised by another gymnast. It is in this manner that the movement is performed on bigger and heavier patients. Children require only one gymnast who then places himself at the side of the patient,—that side, to which the flexion is directed—lets the patient take support on his forearm which is stretched forward horizontally and exercises counter-pressure with his other hand. The movement is a trying one, so that short intervals for rest are necessary; these are best taken by the

patient's returning to the position from which the movement is made.

Forward-lying side-flexion, Fig. 55,

is performed so that the trunk remains on the apparatus, while the legs are conducted to the side, as shown in fig. 55. This movement is much easier for the patient to take than the preceding and does not either require so much strength on the



FIG. 55.

part of the gymnast. Although the movement is really a trunk-flexion, it used to be called on account of the manner in which it is performed

Forward-lying double leg-carrying

(to the left or right).

CARRYING

is, as has been described on page 89, a kind of flexion and extension

Arm-carrying forward-backward (see page 92)

Arm-carrying outward-upward and outward-downward
(compare page 89)

Leg-carrying forward-backward (see page 95 a)

Leg-carrying outward-inward

Arm-carries are generally performed double-sided, but leg-carries with but one leg at a time, both in most cases actively and with fully stretched extremities, so that the movement is solely made in the respective shoulder or hip-joints. Leg-carries are given in high arm-lean-standing position (compare fig. 58). For stiffness in the hip-joint or surrounding muscles the last-named movements are pretty much used (compare *leg-swinging*, page 95).

Double plane arm-carrying (Zander, A 5; A 6)



FIG. 56.

is the name for the movement that takes place, when the arms are carried in a horizontal plane. It is frequently employed in Medical Gymnastics to expand the chest and to stretch the spine, especially for round-back.

The movement is always taken from reach-position, so that the arms are carried in a horizontal plane as far back as the build of the shoulders allows, while the gymnast, standing in front of the patient, takes hold of his wrists and exercises resistance when the arms are carried backward, but, on the contrary, the conducting forward again of the arms takes place without resistance. The movement is easiest as

Back-lean-standing double plane arm-carrying (Zander, A 5; A 6),

when support is taken against a pole or door-post; it is somewhat stronger as

Leg-lean-standing double plane arm-carrying (see fig. 56) (Zander, A 5; A 6),

and requires considerable exertion as

Leg-forward-lying double plane arm-carrying (fig. 57).



FIG. 57.

Besides the arm-muscles all the extensor muscles of the back are much taxed in all the above-mentioned double plane arm-carryings, especially in the last.

Another arm-movement in the horizontal plane, which Medical Gymnastics has borrowed from the Pedagogical, is

Double arm-flinging sideways,

when the arms from the position "arms-forward bend" (fig. 5, page 24) are quickly outstretched and conducted backward during expiration.

Double leg-carrying to the side is used in order to produce a strong side-flexion of the trunk in curvature of the lumbar region of the spine and is called:—

Forward-lying double leg-carrying

to the left and to the right respectively: (see fig. 55, page 106).

SWINGING

is distinguished from carrying in the movements mentioned below only in this way, that the movement is performed more quickly in swinging.

Arm-swinging forward-backward (see page 92)

Leg-swinging forward-backward (see page 95)

DRAWING

Leg-flexion and -extension (see page 95 and fig. 79)

Knee-up-drawing and -down pressing (see page 95)

Leg-backward-drawing

is always given as a movement of resistance and always as

High arm-lean-standing leg-backward-drawing, Fig. 58
(Zander, B 1).

The gymnast stands behind the patient, takes hold of, with one hand, the front of his lower leg just above the ankle and draws the leg in a backward direction, after which the patient



FIG. 58.

brings it forward while the gymnast makes resistance; the gymnast puts his other hand on the patient's hip, by which the movement gains a certain steadiness in the performance. Besides all the muscles on the front side of the leg being active in this movement, those of the abdomen are also brought into action.

Forward-drawing

is the name of a trunk-movement, that helps correctively to straighten the spine, so that it is advantageously used for curvatures of the spine.

Stretch-grasp-standing forward-drawing (*back against*) (Zander, K 1, Back-lying)

is used for round-back. The patient places himself with his back against a rib-stool or peg-post, holding his hands as high up on the same as possible. The gymnast stands in front, puts his hands on the patient's back and performs a drawing forward, by which the round-back is redressed and the chest expanded. The movement is often repeated with short intervals for rest, so that the patient can breathe freely.

Stretch-grasp-standing forward-drawing, Fig. 59 (Zander, K 1, Side-lying) (*right side against, or left side against*),

(i. e. the side, to which the curvature has a convexity, turned toward the apparatus) is used for scoliosis. The gymnast stands in front and at the side of the patient and performs a drawing forward of his chest in a diagonal direction, so that the greatest convexity of the curvature is most influenced. It is still better, and less exerting to the gymnast if he stand behind the patient and practice a pushing-forward in a diagonal direction (see fig. 59). The movement can be given so strongly that the patient's legs are lifted from the floor, without his feeling the slightest pain.



FIG. 59.

ABDUCTION and ADDUCTION

This name is only used for abduction and adduction of the leg, performed as a movement of resistance. It is a good muscle-movement and is thus used to advantage in dietetic Gymnastics.

Half-lying double leg abduction and adduction,

Fig. 60 (Zander, B 5; B 5a; B 6),



FIG. 60.

is a movement much liked by elderly patients. Two gymnasts stand at the side of the patient and facing him; they support his straight-outstretched legs by the ankle against their upper legs, then take hold of the patient's ankle with their nearest hand and thus offer resistance both in abduction and adduction.

In some cases the movement is only performed with one leg, for example, in cases of paresis; support should then be

given to the one leg, so that the movement may be steady and strong.

Stretch-lying double leg abduction and adduction

(Zander, B 5a; B 6) and

Stretch-hanging double leg abduction and adduction

are given to younger patients; the first-mentioned in co-ordinate movements; the latter when a general muscle-movement and, at the same time, a stretching of the spine is desired, for example, for scoliosis and round-back; the movement can be given so that the patient hangs on a trapeze or boom or on the peg-post with his back supported against it, which last position is much to be recommended for round-back.

Double knee abduction and adduction, Fig. 61,

(Zander, B 5, C)



FIG. 61.

is given in **hook-half-lying** position. It differs from the above described double leg abduction and adduction only in this respect, that resistance is exercised at the knees, by which

the abdomen and pelvic organs are said to be specially influenced and in a higher degree; that this is the case has always been maintained, but has not hitherto been satisfactorily explained.

RAISING

Under this name are included a number of movements, in which the trunk is moved from lying or forward bend position



FIG. 62.

to an upright or somewhat backward bend—thus a kind of back-extension or dorsal-flexion. A great number of forms of movement of this kind have formerly been used, but several of them can not be satisfactorily explained, or else can be replaced by others, so that here only such are taken up as are of special value. For the term, neck-raising, see page 120.

Sit-lying raising, Fig. 62 (Zander, C 3; C 1).

The gymnast gives support to the patient's knees and it is often necessary to facilitate the movement for more delicate patients or for such who are unaccustomed to take the movement, by lifting the back slightly, because as a purely active movement it is trying to perform. It is often used, and especially for children and young people, but it is of great importance that the gymnast sees that the movement is not incorrectly taken. The head and shoulders, for example, are easily pushed forward, the trunk twisted to either side, the raising is uneven, i. e. done with a sudden jerk etc. The movement should be done slowly and evenly, with good and unchanged bearing of the head and trunk, and a little pause at the extreme positions should be taken, both in the lying and sitting, so that the patient then makes an inspiration, as this should not be done during the movement itself. It principally brings into action the muscles of the abdomen and can thus be given on all occasions when these are but weakly developed. By expanding the chest and bearing the head and shoulders well, this movement can be used for round-back, flat-chest and for a defective bearing in general. The commonest positions for the arms in sit-lying raising are:—hips-firm, neck-firm and stretch, by which a gradual strengthening can be the result and the following forms of movement arise:—

Hips-firm sit-lying raising,

Neck-firm sit-lying raising,

Stretch sit-lying raising.

Arm-lean-standing raising with abdominal- and lumbar-pressing (see page 65 and fig. 32)

Leg-lean-standing raising, Fig. 63
(Zander, C 5; C 2; C 4),

is always performed as a movement of resistance, in such manner that the gymnast stands or sits in front of the patient and offers resistance in the raising by taking hold of his hands or, best of all, by their both holding a rod with their hands. In this form, lean-standing-raising is oftenest given in dietetic



FIG. 63.

gymnastics as a particularly good and powerful muscle-movement, which taxes many of the muscles of the trunk and extremities.

In treating scoliosis, resistance is offered from behind by the gymnast standing there who exercises pressure with his hands on the greatest convexity of the curvatures and thus, at the same time, makes resistance in the raising. Another gymnast is often required, who, from in front, assists the raising by pressure on the patient's shoulders, and in this way the

movement will also be more even. This form of movement is called

Leg-lean-standing raising with pressure in the back.

Fig. 64



FIG. 64.

Closely allied to the movement last described are

**Hips-firm high ride-sitting raising and
Stretch stoop stride-sitting raising,**

when pressure is made in the same manner on the patient's back; in the last-named, support is given on the patient's wrists by the gymnast standing in front of him.

Reach stoop-sitting raising in different planes

is used for paresis and weakness in the back- and trunk-muscles. The gymnast sits in front of the patient and offers re-

sistance as in lean-standing raising, at the same time he so performs the movement, that the raising takes place in different directions, by which most of the muscles of the side parts of the back and trunk receive their proper share of the movement. This movement should be of use therefore, under the circumstances described above.

Sitting spinal-raising upwards, Fig. 65 (Zander, L 6),



FIG. 65.

is a splendid movement of correction and bearing for little children with spinal curvatures of one kind or another. The patient places his hands as in hips-firm but in the groin and, by putting the extensors of the arms into action, makes a lifting of the trunk, while a powerful stretching takes place at the same time in the spine. The gymnast stands behind or at the side of the patient and sees that he carries his shoulders backward as far as possible; a slight pressure in the middle of his back and over the crown of his head (see fig. 65), urges

him to still greater exertion, i. e. the movement is changed from a purely active one to a movement of resistance.

Hips-firm sitting raising with back-stroking, Fig. 66

Two gymnasts assist in the performance of this movement. They stand on either side of the patient and put their one hand on the front side of his shoulder, the other on his back, up between the shoulders (see fig. 66). While the patient raises



FIG. 66.

himself from stoop-position, the gymnasts assist him with their hands, which they place on his shoulders, and at the same time make a slow but powerful stroking down over the patient's back. The hands placed here are generally one on top of the other, and the stroking is done in the middle of the back. The movement is to be looked upon as being really a kind of chest-expansion or a straightening and widening of the chest. It is principally used in dietetic gymnastics for elderly and more delicate patients, who find it very agreeable and beneficial.

The name *raising* is used also for head-flexion backward, when resistance is made, and is then called *neck-raising* (compare page 105). The most ordinary forms of movement are:

Arm-lean-standing neck-raising,
Stretch-hanging neck-raising, and
Stretch forward-lying neck-raising

FALLING

is a name which, in Medical Gymnastics, is only used for one or two forms of movement.

Hips-firm high ride-sitting backward-falling, Fig. 67
 (Zander, C 3),



FIG. 67.

is a movement which is seldom given alone, but oftenest together with trunk-rolling.

Backward-falling is done from the upright-sitting position to about an angle of 45° , and its performance taxes the muscles of the abdomen. Support must be given to the patient's knees. The movement is easiest to perform in hips-firm; is strengthened somewhat in neck-firm and still more in stretch position.

Backward-falling occurs also in sit-lying-raising (see page 115), although it is then

continued, until the trunk comes into an horizontal position. In both these cases the movement should take place in the hip-joints and not in the spine, which should all the time be kept stretched as in the fundamental position.

The following movements are somewhat more commonly used:—*head-side-flexions*, which are generally comprised under the name falling.

Crutch-standing head-side-falling, see page 101,

fig. 51, and

Lying head-side-falling, see page 99

RINGING

Ringling is always performed as a passive movement and has been considered to be of extraordinarily good effect against insomnia.

Hips-firm ride-sitting side-ringing. Fig. 68

Two gymnasts stand behind the patient, cross hands across his shoulders (see fig. 68) and, with the upper part of his body, perform quick bendings or ringings from one side to the other, so that a strong side-flexion arises, followed by a short pause for rest at the extreme positions. From 6 to 8 ringings are made to each side, after each of which there is a pause, and the whole is repeated 3 or 4 times. It is important that the patient be quite passive in the performance of this movement or that he only slightly assist; if, on the contrary, he offer resistance, the movement can only be performed with great difficulty, and the effect will be of minor importance. The patient should receive good support for his feet and legs and the gymnasts' grip should be so firm that they do not lose it.

Hips-firm long-sitting ringing forward-backward

The gymnasts place themselves at the side of, and a little behind the patient, put the hands nearest him in front of his arms and behind his back, where they clasp each other; the gymnasts put their free arms on the patient's back, so that their hands lie on each other against the back of his head. In this manner good support is given and the gymnasts can



FIG. 68.

easily and firmly perform the ringing in a forward-backward direction. In other respects the same rules hold good in this movement as in that described above, which however offers more advantages both in the position and grip, and is consequently much more used and preferred. Ringing is always disagreeable at first, but one soon becomes accustomed to it; it is a very powerful movement so that the patients, on whom the same is to be practised, ought to be relatively healthy and fairly strong.

TWISTING (= Rotation)

Twisting is generally given as a movement of resistance, sometimes as a passive movement.

Arm-twisting (Zander, A 8a)

is either performed as follows:—the gymnast and patient take hold of each other's hands (right against right or vice versa) and the patient performs the twisting while the gymnast offers resistance; or else as

Yard-sitting arm-twisting with rod, Fig. 69,

FIG. 69.

when the patient takes hold of the middle of a rod with his hand (size of rod No. 2, page 15) and the gymnast holds the rod at both ends, so that the exertion required for him to offer re-

sistance is not great. Arm-twisting is an excellent exercise for the muscles, because most of those of the arms are brought into action in its performance. In the above-named twistings the arms should be twisted to their utmost extent, as well in the shoulder-joints as between the ulna and the radius.

With the last-named grip and arm-twisting often accompanying it, is also performed

Arm-shaking (page 74) (Zander, F 1).

Forearm-twisting (Zander, A 8a).

If twisting is to be done alone between the radius and the ulna, this takes place actively best in this manner, that the



FIG. 70.

upper arms are kept close to the trunk and the forearms well stretched forward, when twisting in the shoulder-joint is avoided. As a passive movement or movement of resistance twisting is best done if the patient's forearm rest on a table (see fig. 70).

Elbow-twisting, or pronation and supination between the radius and the ulna, should not be mistaken for rolling, or circumduction. I have often seen gymnasts perform rollings in the elbow-joints, which is easily excusable, for if one does not understand how properly to analyse a movement, twisting combined with flexion and extension may appear to be the same as rolling, especially as, on attempting to perform the movement in question, the rolling, to a great extent, is referred to the shoulder-joint.

Leg-twisting (Zander, B 8)

or rotation in the hip-joint is performed in the position shown in fig. 8o. The leg is kept well extended at the knee-joint and the foot forms a right angle with the lower leg, i.e. strongly dorsally flexed. Leg-twisting is always given as a movement of resistance which is applied to the foot; the movement is much used because in the performance of it most of the muscles of the legs are put into action.

Foot-twisting (Zander, B 13).

Foot-twisting inwards, inversion, is rather easily performed, and is a movement often used in treating flat-foot, when the gymnast should fix the patient's heel with his one hand and with the other hold the fore-part of the foot. The patient should perform the movement actively as far as is possible, after which the gymnast completes the twisting as a passive movement while practising firm pressure under the sole of the foot.

Foot-twisting outward, eversion, is, on the other hand, employed for club-foot. Although the twisting itself is considerable, still by the pressure that is practised on the under part of the patient's foot, a considerably redressing effect is gained, which, often repeated, gives good results, as the treatment is generally for children with yielding joints. In both the last-mentioned movements the patient takes the position shown in fig. 8o.

Head-twisting

is used under the same circumstances and in the same positions as head-flexions.

As passive movements, head-flexions, twistings and rollings are best performed in the position shown in fig. 71.

Lying head-twisting



FIG. 71.

Trunk-twisting (Zander, C 7; C 8).

Three trunk-twistings, termed *alternate-twisting*, *plane-twisting* and *arch-twisting*, have a similar influence; they are always given as movements of resistance, and a certain progression is to be found in them, so that *alternate-twisting* is the weakest, *arch-twisting* the strongest. All of these strongly tax the muscles of the abdomen, and thus influence the organs of digestion; they are also important because they expand the chest, of which more will be said in the description of abdominal and chest diseases. The above-named trunk

twistings are, besides, very good muscle-movements and therefore used in dietetic gymnastics.

Alternate-twisting

is performed in many different ways and there are a number of variations of it, but as most of them are arranged more oddly than wisely only the most general and easiest to perform are treated of here. Alternate-twistings can be grouped into three principal classes, chiefly distinguished by the position, and consequently by the part and extent of the body that take part in the movement.

Hips-firm ride-sitting alternate-twisting. Fig. 72
(Zander, C 7)



FIG. 72.

As the pelvis and legs are fixed by this position, the twisting takes place in the upper part of the trunk. The gymnast stands behind the patient and offers resistance on his shoulders,

while the patient performs the twisting. Resistance is the same on both shoulders, so that, for example, in twisting to the right, the gymnast's right hand is placed on the back of the patient's right shoulder, the left hand on the front of the left shoulder. When the patient has performed the twisting as far as possible with resistance, the gymnast changes his grip, i. e. the right hand is removed to the front of the patient's right shoulder, the left to the back of the left shoulder, after which the gymnast completes the twisting to the right as a passive movement. Immediately afterwards the patient commences twisting to the left, while the gymnast, with the last described grip, makes resistance, and so on several times. Thus the gymnast has to change his grip only at the extreme positions. Alternate-twisting is undoubtedly best and most powerfully performed in the position explained above, especially if the legs be well fixed by giving support to the feet and knees.

Stretch stoop-stride-sitting alternate-twisting

is mentioned here because of being rather frequently employed, but the position that forms the basis of the movement is not sufficiently steady to attach any real value to it; besides, the muscles of the trunk are not taxed so much when the patient is bent forward. The resistance applied for the twisting is brought about by the gymnast's standing on a somewhat higher level than the patient and then clasping the latter's hands. Thus the movement is really not a trunk-alternate-twisting, as the muscles of the arms are more taxed than those of the trunk.

Trunk-alternate-twisting is also performed in such a position that the feet and hands are fixed, as in

Stretch grasp-standing alternate-twisting (Zander, C 8)

Twisting is here performed with the entire trunk, the arms and legs being also included, as resistance is placed on the hips.

Heave grasp-standing alternate-twisting

is better than the foregoing, because the position (compare fig. 35) here gives good support to the arms and shoulders, so that the twisting, to a greater extent than in the preceding case, will become what it is intended to be, namely, a trunk-twisting. This movement is in itself not so fatiguing as sitting alternate-twisting; it is rather agreeable to take and is therefore used as an easier trunk-movement for elderly patients. This remark applies still more to

Hips-firm-standing alternate-twisting,

during which the gymnast sits in front of the patient and gives support to his knees and feet with his own knees and feet. Resistance to the twisting is, as in the preceding cases, placed on the hips.

Hips-firm kneeling alternate-twisting, Fig. 73,

FIG. 73.

is a very powerful movement, that particularly taxes the muscles of the abdomen.

The gymnast stands behind the patient, and gives support to his back with one knee, as fig. 73 shows. Resistance is placed on the shoulders. The movement, on account of the position taken, is considered to influence the organs of the pelvis. It should not be given to weak patients.

Hips-firm sitting plane-twisting, Fig. 74,



FIG. 74.

is a combination of twisting and raising. The gymnast stands behind the patient and, with his left arm, takes hold of the patient's left shoulder if the twisting is to be done from the left forward, and vice versa. The gymnast can only get the proper grip if he lays his arm over the patient's shoulder, puts it from in front under the patient's shoulder and on towards his back, so that the posterior surface of the gymnast's forearm and hand rests against the patient's back (fig. 74). Resistance will here be placed on the patient's trunk and not on his arm, as often incorrectly happens. The grip on the right shoulder

is the same as in alternate-twisting. In performing the movement from the left side, the patient bends his trunk down to a horizontal position and twists it to the left, after which he raises himself to a sitting position with a simultaneous twisting forward, while the gymnast offers resistance. Here a short rest is taken, as this movement requires rather great exertion on the part of the patient. It is therefore only given 6 or 8 times to each side, and only to relatively healthy and strong persons.

High ride-sitting arch-twisting, Fig. 75,



FIG. 75.

is a still stronger trunk-twisting or, more correctly speaking, a combination of twisting and raising, as is plane-twisting. The gymnast stands behind the patient and so placed that if, for example, the twisting shall be done to the left, the gymnast stands turned to the left with his right shoulder and upper arm giving support to the patient's back, with his left hand holding the wrist of the patient's upward-stretched left arm,

and with his right hand leaning against and supporting the patient's trunk in the left arm-pit (see fig. 75). The patient holds his free hand in hips-firm position. The movement is performed so that, while the patient offers resistance, the gymnast draws the latter's arm and with his trunk makes a curve to the left, backward and downward toward the middle line, but not quite to a horizontal position, after which the patient raises himself to sitting position, while the gymnast offers resistance. Arch-twisting is a very strong movement and is therefore only given to strong, middle-aged persons. It has been considered to have an excellent effect upon the organs of the pelvis and abdomen.

One method of twisting is performed as a passive movement and is called *screw-twisting*. It is generally given as

Hips-firm ride-sitting screw-twisting, Fig. 76 (Zander, E 7)



FIG. 76.

by two gymnasts, who stand behind and at the side of the patient, turned toward each other. The gymnasts each place one hand between the patient's shoulders which they alternately draw backward while, with their free hands laid the one on the other, they support the patient's back, as shown in fig. 76. As the movement is generally quickly performed, it can be looked upon as a cast-twisting. Screw-twisting has been much used, as it has been considered of use in cases of catarrh and other diseased conditions of the visceral organs of the abdomen and pelvis. It should certainly be of use in cases of lung-emphysema on account of the pressing together that occurs in the lower part of the chest. It might possibly also influence and accelerate the circulation of the liver as a result of the above-mentioned alternate pressing-together of the lower part of the chest which takes place. The twistings become stronger the further down the back the support is given.

Circle-twisting, as the name implies, has been considered to be a twisting, but as it is a true rolling, it is described under that group of movements (see page 141).

The name **forward-twisting** is used for the movement that arises when trunk-twisting takes place several times from the one side forward to the frontal plane, to be afterwards continued from the other side. A similar twisting several times from either side to the frontal plane is used in plane- and arch-twisting also, chiefly perhaps because the grip in these movements is not so easy as in alternate-twisting, as it takes more time and trouble to change the hold.

In cases of a sinking-in of the one-half of the chest, for example, in pleurisy and kypho-scoliosis, such a forward-twisting or twisting from the one side only is indicated. In most other cases however alternate-twisting will be preferable to forward-twisting, as every alternate side-movement is less tiring.

The position should be well fixed in forward-twisting, so that the movement is best given as

Hips-firm ride-sitting forward-twisting

(to left or right).

ROLLING (= Circumduction)

is a form of movement that is used in Medical Gymnastics in all the joints in which it can be performed. It is, along with other joint-movements, of very considerable importance, as it helps to overcome diminished mobility in a joint, but rollings are also much used because of their influence in furthering circulation, of which more will be said in describing the treatment of diseases in the circulatory organs. Trunk-movements are also of importance in treating diseases of the digestive organs.

Yard-sitting double arm-rolling, Fig. 77 (Zander, A 7a),



FIG. 77.

is a movement much used, and performed thus:—the gymnast stands behind the patient and with his trunk gives support to the latter's back; the gymnast takes hold of the lower part of the patient's upper arms, lifts them up into a horizontal position and performs the rolling so that the arms are conducted in large circles in the direction forward, upward, backward, downward, several times, at the rate of about 40 rollings a minute, this being continued two or three minutes. Although this movement is always passive, it has considerable influence on the organism, a proof of this fact being that heart-patients cannot always bear it, at least not if the arms be conducted higher up toward perpendicular position; if, during the rolling, the arms be not conducted higher up than to the horizontal-plane, the movement can better be tolerated. For very weak and sensitive heart patients, instead of using the above movement the following may be advantageously used:—

Heave-sitting single arm-rolling, Fig. 78
(Zander, A 7a)



FIG. 78.

when the patient's arm is taken hold of at the elbow and by the hand, and the rolling is performed with one arm at a time (fig. 78).

If rolling is to be used against stiffness in the shoulder-joint, it is best taken in yard-sitting position, but so that the gymnast places himself at the side of the patient and holds his hand, as in this way the rolling can be performed in several different planes. The same advantage is gained in heave-sitting single arm-rolling, but not in yard-sitting double arm-rolling.

In addition to the above-named positions, double arm-rolling is often given together with double arm-flexion and extension as

Half-lying double arm-rolling, -flexion, -extension
and

Sit-lying double arm-rolling, -flexion, -extension,

whenever the desire be to give a thoroughly good arm-movement, as, for example, in dietetic gymnastics.

Hand-rolling (Zander, A 7, C)

A rolling in the wrist is easily performed, although the joint is really not so formed as to permit accurate work; but the transition between the extreme palmar-, radial-, dorsal-, ulnar-flexions or vice versa, takes place easily, so that the hand in the wrist-joint can perform fairly large circularly formed movements. The position is given in describing wrist-flexion, page 93 (compare fig. 46).

Finger-rolling

takes place in the metacarpo-phalangeal-joints. The rolling is performed separately with the thumb; with the other four fingers together, if the out-stretched fingers be held in the gymnast's hand. These movements are generally passive, but can also be easily performed as active.

Leg-rolling

is always performed as a passive movement and generally in half-lying position, but it can be given in lying position to patients confined to bed.

Half-lying leg-rolling. Fig. 79 (Zander, E 5)



FIG. 79.

The gymnast stands at the patient's side and takes hold of his leg with one hand under the foot, the thumb turned inwards and the fingers outward; the gymnast's other hand, with the fingers turned upwards, holds the patient's knee. This grasp is the most convenient and the only one that allows the movement to be well performed; it is also of great importance that the gymnast take a proper position in relation to the patient; the latter is most comfortably placed, if the leg not treated rest

outstretched on a stool (see fig. 79). The grasp of the foot should be firm and sure, but, on the other hand, lighter over the knee. In the rolling, the knee should form as large circles as possible, while the foot is conducted in an up and down direction, as far as possible in the sagittal plane, but kept low all the time. Leg-rolling is often incorrectly given, in this way, that the foot is held high up and large circles are made with it and the lower leg, while the rolling in the hip-joints is only inconsiderable.

Leg-rolling is done both in outward and inward direction, as it is intended to influence stiffness in the hip-joint. It is besides one of the principal movements for furthering circulation and should in this case only be done in an outward direction, as it is then easier. When leg-rolling is given to influence the abdominal and pelvic organs, it should likewise be given in the same direction.

Foot-rolling (Zander, B 12)

can best be performed actively, when the patient sits so high that the feet do not touch the floor when the legs hang straight down. Active foot-rolling is much to be recommended for persons troubled with cold feet.

Half-lying foot-rolling, Fig. 80 (Zander, B 12),

is one of the movements most often used in Medical Gymnastics. It is given almost in the same position that has been prescribed for foot-flexion and extension—only with this difference, that the gymnast, with his one hand, grasps the foot from above, while with the other hand he holds fast the lower leg just above the ankle (see fig. 80) by which means the rolling really takes place in the ankle-joint when this is intended. But the gymnast must here be careful to observe that the foot is not carried up to quite dorsal-flexed position because then the structure of the ankle-joint does not allow rolling.

Foot-rolling is also given as a circulatory-movement and can then be performed as



FIG. 80.

Half-lying double foot-rolling,

when the gymnast sits in front of the patient, and places the latter's legs on a stool or on a cushion on the stool, so that the feet hang over. *One* gymnast can then perform double foot-rolling by grasping one foot with each hand. It is to be observed here, however, that although the rolling affects to a certain extent the ankle-joints, it is principally transferred to the hip-joints, which in no way interferes with the desired effect.

Toe-rolling

is done with all the toes together as in the corresponding finger movement; toe-rolling is used, as well as *toe-flexion* and *extension*, for deformities of the toes; for spasmodic contractions attending nervous diseases and for disorders in the circulation, of which more will be said farther on

Trunk-rolling

is performed as a passive movement best in high ride-sitting position. Gymnastics make use of two trunk-rollings of different extent and strength.

Hips-firm high ride-sitting trunk-rolling, Fig. 81
(Zander, D 3),



FIG. 81.

is the greater and stronger. The gymnast stands behind the patient, takes hold of his shoulders with his hands, so that, if the rolling shall be to the right, the gymnast's right hand

holds the patient's right shoulder from above, while the left hand holds the patient's left arm-pit (fig. 81). The gymnast makes as large circles as possible with the patient's trunk by moving it forward, to the right, backward, to the left etc. several times over, after which a rest must be taken and the rolling is afterwards executed in the opposite direction. The gymnast should see that the bearing of the patient's body be good and that the trunk incline evenly to either side; very stout and also very weak patients cannot bear the trunk to be conducted so far backward, as this stretches their abdominal muscles too much, for if the movement be passive, still the patient must, by his own muscular strength, keep the trunk in an erect position.

In order that trunk-rolling shall be properly performed on very stout and heavy patients, two gymnasts are required, who then use the bearing and position shown in fig. 68, page 122.

High ride-sitting circle-rolling

or *circle-twisting*, as it has before been called (cp. page 133), is given in the same way as plane-twisting (see page 130 and fig. 74). The patient leaning quite backwards, should support himself upon the gymnast, who makes the rollings as small or large as the patient's condition allows. The patient's trunk is not carried, in this movement, evenly to either side, but more to the right, when circle-rolling is performed to the right and vice versa, while the middle-line is slightly passed. The trunk consequently really makes an elliptical figure and not a circle. The name is thus in this respect not so well chosen.

Circle-rolling can easily be supported even by the weakest patients, when there is a question at all of their using Medical Gymnastics.

Both trunk- and circle-rolling are good movements for furthering circulation and are thus always given for heart-disease. Trunk-rollings are also used for diseases of the digestive organs.

Head-rolling

Arm-lean-sitting head-rolling and

Arm-lean-standing head-rolling

are given as movements for furthering circulation. The gymnast stands by the patient's side, holds his head, by placing the hands on the patient's forehead and neck, and performs slow, extended rollings 8 to 10 times to each side, which can be repeated after a short rest. The grasp on the head should be firm, without any pressure being used. Generally the hold is taken only with the thumb and forefinger, not with the whole of the inside of the hand.

Sit-lying head-rolling

is used when stiffness of the neck is to be cured, and is given in the same position that is prescribed for head-flexions, page 99 (compare fig. 71, page 126).

HOLDING

is a term in Gymnastics, signifying, that certain groups of muscles are in a state of active tension, generally to keep the body in a certain position, but without any movement being made. Holdings can be used as derived positions in order that stronger active movements may be performed with them.

Stretch-sitting holding with rod, Fig. 82 (Zander, A 4),

is an excellent holding-movement for children, and is principally used for round back, but also to advantage in scoliosis.

The gymnast stands behind the patient and offers slight

resistance to the rod as the patient stretches his arms, and resistance is still offered even when the arm-extension has reached its maximum, so that the patient is obliged to keep a stretched and corrected bearing of the body for a longer time. The gymnast must see that this is really done, and with his one hand should give necessary pressure on the spinal-curvature and thus, as it were, adjust the patient.



FIG. 82.

Spring-sitting holding (see fig. 18)

How this "holding-movement" must be taken so as to work correctively on curvature of the spine, and be of proper use, will be explained in connection with the treatment of scoliosis. The gymnast must be particular in seeing that the holding is correctly taken, because the patient himself cannot, without much practice, assume the correct position. If he wish to take this movement at home and cannot have it corrected by a competent person, he should take it in front of a large looking-

glass, when self-correction is easily made by one who has any idea of gymnastic holding.

This manner of self-correction may be used for a great number of free-standing movements.

Hips-firm leg-forward-lying holding (see fig. 19)

(Zander, L 2),

strongly taxes all the extensors of the back when, with the help of these, the trunk must be kept in a horizontal position or even in an upward-backward concave-arch. It is therefore a good holding-movement to prevent the progress of spinal-curvatures or to curatively influence curvatures already existing. How the holding is performed has been described on page 40 under the heading, leg-forward-lying. The holding should not be permitted too long at a time by patients unaccustomed to gymnastics. To make it less exerting, the patient is allowed to take kneeling-position, so that he can rest properly before continuing the movement.

Stronger than the preceding are

Neck-firm leg-forward-lying holding and

Stretch leg-forward-lying-holding

If one also wish to stretch the spine as well, such movements as the following are given:—

Stretch leg-forward-lying double arm-flexion,

Stretch leg-forward-lying double plane arm-carrying

(see fig. 57), and

Stretch leg-forward-lying neck-raising (see fig. 50)

All these holding-movements described above, stretch the spine and its muscles; they can thus be used for all forms of spinal curvature, of which more will be said in describing these affections. If the object be to especially influence lateral curvatures of the spine the following movement may be given:—

Leg-side-lying holding (see fig. 20)

Leg-side-lying position, described on page 41, is only used as leg-side-lying holding. The patient then generally takes hips- or neck-firm position. During the performance of the movement the gymnast usually stands behind the patient and sees that the holding is correct in form, and gives the patient support during the intervals of rest by placing his arm under that shoulder of the patient which is turned to the floor.

HANGING

has been described as a fundamental position (page 21), and *heave-hanging*, as a position derived from the fundamental (page 42). They are also adopted as movements in connection with and allied to holdings, because the definition given for holding can be applied also to a proper hanging, and still more to the heave-hanging position; and further because hangings, as well as holdings, stretch the spine and, like these, are mostly used in Medical Gymnastics in the treatment of spinal curvatures.

From the hanging position the following movements are performed:—

Stretch-hanging heaving (page 86),

Stretch-hanging double leg- ab- and adduction (page 113), and

Stretch-hanging neck-raising (page 120).

Hanging is also used to influence scoliosis, and is particularly effectual for this object in the method which will now be described. The gymnast and patient stand in

Side-suspension (Fig. 83) (Zander, K 11),

on either side of a boom, placed at such a height that it corresponds with the greatest convexity of the spinal curvature,

when the patient takes a hanging position, which is done in this way; he stands on his toes, bends his side over the boom and is drawn farther over by the gymnast, with the grasp shown in fig. 83. Side-suspension is, as before mentioned, a stronger form of side-flexion at the boom. It must not be



FIG. 83.

carried too far if the patient be unaccustomed to it, but it can gradually be augmented and prolonged, so that, for short periods, the patient really hangs over in the above-mentioned position, i. e. without support for his feet.

FREE-STANDING MOVEMENTS

On many occasions it is of importance to have a number of free-standing movements, which can be taken either in the gymnasium, at school or at home.

A physician often gives this prescription:—*take more exercise*, but on his patient's asking "what manner of exercise," the answer is generally:—walk, ride or drive.

Walks in the fresh air should always be prescribed and never neglected by anyone, but the benefit produced is somewhat restricted, and consequently not always sufficient. Only few can afford to ride or drive.

Gymnastic movements give the most comprehensive and the best exercise and in this respect can not be replaced by anything else. The daily-exercises used at the Gymnastic Orthopædic Institute are given here below. The movements are so chosen that they can easily be taken and tolerated by persons of all ages and of both sexes. Most of these movements have already been described. Some of them, for example, Nos. 3 a, 6 a, 6 b, 9 and 13, can, at first, only with difficulty be performed by children, and perhaps also by older persons who are quite unaccustomed to gymnastics, so that in this case these movements can be omitted, to be gradually inserted afterwards. In order that the movements shall be properly performed, one or more lessons from a gymnast should be taken, but even if they be not performed well, they always do good and never, under any circumstances, do harm. They can be used together with Medical Gymnastic movements or independently of these.

A few free-standing movements often serve to keep up what has been gained, in a therapeutical respect, by means of Medical Gymnastics.

The number of times each movement should be taken to begin with, in each direction or with each limb, is prescribed at the end of each movement. The whole of a daily-exercise can be completed in 10—15 minutes, even if short pauses for rest be taken between each movement. Anyone wishing to take more can easily make a necessary increase either by taking the movements several times or by using more strength in performing them.

1. **Standing double arm-heaving outward-upward and outward-downward, 4—6 times (see page 88).**
- 2 a) **Hips-firm standing alternate ankle-flexion, 10—15 times.**

The fundamental position is retained in every respect but this, that a strong dorsal-flexion of the left foot is made, which is kept for a short time in strong flexion upward, after which it is quickly placed on the floor and the right foot immediately performs the same movement.

- 2 b) **Hips-firm standing heels-raising, 5—6 times,**
(see page 88).
- 3 a) **Hips-firm standing trunk-flexion forward-backward**
3—4 times,
(see page 102 and figs. 14 and 15).

Stretch-standing trunk-flexion forward-backward
can be used by healthy persons as an essential increase of the preceding movement (see page 102).

- 3 b) **Close-standing side-flexion, 3—4 times.**

With little children this movement can advantageously be repeated, between Nos. 8 and 9 given here below.

If there be a spinal curvature, side-flexion should only be done to the side that has the convexity of the curvature.

4 a) Standing double arm-raising with hand-flexion and -extension, 5—6 times (compare No. 1).

A strong palmar- and dorsal-flexion with a short pause at the extreme positions is repeated 5 or 6 times, as well during the arm-raising as during the succeeding lowering. If the movement be correctly performed, it demands considerable exertion, so that, at first, *one* raising and lowering will suffice.

4 b) Standing double arm-raising with arm-twisting and finger-flexion and -extension, 5—6 times (compare No. 1).

The fingers are strongly bent, so that the hands are tightly closed at the end of the supination, then stretched and opened on pronation. Otherwise the same rules apply here as in the preceding movement.

5. Standing knee-flexion and -extension, 3 times,
(see page 96 and fig. 12).

Generally the three flexions and extensions are performed with the arms in the different positions viz., in hips-firm-, yard- and stretch-standing.

The movement, in order to make a little change, can be performed with simultaneous arm-heaving during knee-flexion, and arm-sinking during knee-extension and in the last phase be finished with a *jump* while a flinging out of the arms takes place.

6 a) Hips-firm stride-standing trunk-rolling, 3—4 times.

The trunk-rolling is performed with well-stretched legs, and without any twisting of the pelvis taking place. Compare page 140.

6 b) Yard stride-standing cast-twisting, 3—4 times.

By cast-twisting is meant a quick twisting from one side to the other, strongly performed, so that the trunk is at once twisted as far as possible to the left or right, while the feet and legs remain in the fundamental position. A short pause is made at the extreme positions. If several take gymnastics together, neck-firm can be used instead of yard-standing, in order to gain space. Compare also alternate-twisting, pages 128—129.

7. Hips-firm alternate knee-upward-bending, 10—15 times
(see page 96).

This movement is also called *knee-upward-bending in place, march*. The left leg is quickly bent upward, so that a right or even an acute angle is formed at the hip-joint, but still keeping the lower leg in a vertical position and with the foot at right angles to the lower leg or else hanging down freely. A short pause is made before the left leg is placed on the floor and the right one lifted, and so on, while the body as a whole is well balanced all the time.

Another very good balance-movement, that can be taken instead of the preceding, is:—

Hips-firm standing alternate leg-abduction, 5—6 times
(compare page 107).

A pause is made at the extreme positions and the body is well-balanced.

8. Standing double arm-flexion and -extension, forward, outward, upward, downward, 2—3 times
(see page 91).

From the fundamental position, bend-standing is taken (see page 24 and fig. 4), after which extension forward is made

as reach-standing position (see page 26); extension outward as yard-standing (see page 25 and fig. 6); extension upward as stretch-standing (see page 27 and fig. 10); in extension downward the fundamental position is taken. Double arm-extension backward has more and more fallen into disuse.

9. Hips-firm stride-standing head-flexion, forward-backward ; head-rolling and head-alternate-twisting, 2—3 times.

Head-flexion (see page 99). Head-rolling should be performed without simultaneous twisting and it is important to see that the head is bent equally to all sides. As to head-twisting it should not be done as cast-twisting but with a pause in the middle position. All head-movements should be made slowly so that no feeling of giddiness is felt.

**10. Hips-firm toe-standing quick march,
15—20 times.**

The march should be elastic and strong, so that the body is lifted high from the floor. It can be performed so that the legs are kept in fundamental position all the time, or else with an alternate *outward-casting of the legs* or *forward-casting of the legs*—the so-called *dandy-run* or *cock-march*. The last two mentioned kinds of march are much liked by children and young people.

11. Standing double arm-flinging sideways, 5—6 times.

See swim-standing (page 24 and fig. 5). From this position the arms are quickly and strongly carried as far back as possible, so that a position resembling yard-standing, (fig. 6), is attained. Together with quick arm-extension an expiration should take place, after which a short pause is made; during the succeeding inspiration the forearms are slowly returned to the swim-standing position.

- 12. Yard-standing double arm-raising outward-upward,**
3—5 times,

should be performed slowly and while a deep respiration is taken, as a finishing-movement immediately after the two preceding ones, which are somewhat trying and therefore tend, in some degree, to increase the action of the heart.

- 13. Fall-out-movements, 3—4 times.**

A description of these is given on page 30 under fall-out-standing (see also fig. 13).

- 14. Standing double arm-heaving forward-upward-outward-downward, 5—6 times,**

is described on page 87.

MASSAGE-MOVEMENTS

Most of the movements used in the practice of Massage, have always had their equivalents in Swedish Medical Gymnastics, as has before been pointed out, but massage-movements are somewhat differently given, so, for this reason, the most important of them are treated of here for the sake of completeness. I here avail myself of the first complete description of the massage-movements that Dr. MEZGER uses. This description was given by the Swedish physicians, Doctors G. BERGHMAN and U. HELLEDAY in the Nordiskt Medicinskt Arkiv, Vol. V. No. 7, Stockholm 1873.

“Concerning the purely Technical part of the treatment, or the manipulations themselves, they are of different kinds, according to the different indications. MEZGER names them, from what has been reported, after the French Massage-terminology. The different kinds of manipulations we saw him use, he called

**Effleurage,
Massage à friction,
Petrissage and
Tapotement.**

In the first two the skin is well rubbed-in with fat.

By

Effleurage

is meant a slow, and, on the whole, superficial and gentle stroking given with the flat of the hands over the affected

part, in the direction from the periphery toward the centrum, i. e. in the direction of the course of the lymphatic vessels and veins. The object here is to further the absorption and removal of the lymph and inflammatory products by the circulation. It is principally used in more severe acute cases, such as the acute synovitis, freshly inflamed soft parts, etc., where these are red and swollen, hot and painful. It may sometimes be necessary to continue the treatment $\frac{1}{2}$ —1 hour or more. —

Massage à friction

is the manipulation oftenest employed, because its proper field is in sub-acute and chronic affections, which, sad enough to say, are those occurring most frequently in MEZGER's practice. It is given much harder than effleurage, partly by means of circular and centripetal rubbings with the hands, and at times it will be necessary to do this with considerable force. Its object is partly, to crush by mechanical pressure the newly-formed vessels and the half organized products of inflammation, partly to put the tissues into a more active reactionary condition, to stimulate the circulation and in this manner further the reabsorption. Chronic synovitis and peri-synovitis, effusions in the synovial sheaths, chronic infiltration of special muscles and muscle-groups etc. are usually the affections for which this manipulation is used.

Petrissage

is another manipulation, and consists in the taking hold, with the hands, of some part of a muscle and lifting it as it were, from its neighbouring parts and then kneading it between the hands. Alternating with this, one rubs, with the flat of the hand, the part of the muscle in question, whilst exercising pressure on it through the skin. This form of massage is used to take away the inflammatory swelling, that often (partly alone, partly secondarily) includes single muscles or whole

groups of muscle, as in acute and chronic muscular rheumatism; in sciatica, when muscles in the vicinity of the nerves are frequently affected. It is also employed to remove, from over-strained muscles, the matter that produces fatigue, and thus to prevent the origin of a myositis from this cause. It is also used, and to great advantage, to put more life into parietic and atrophic muscles.

By

Tapotement

is meant a beating or clapping on the part of the body to be treated. Done with the closed hand (*à poing fermé*), it is intended to influence deeper situated parts; executed with the flat part of the hand (*à main plate*) principally to affect the skin itself. A third method is to form a concavity with the flat part of the hand and so to let the layer of air influence the skin (*à air comprimé*). Tapotement is used, when the object is either to stimulate or diminish in the manner described, the local nerve activity, whether this be in more deeply situated nerves or in those of the skin. In order analogously to influence the latter, other means could, of course, be resorted to, than using the hand.

For neuralgia of the face, instead of using the fingers, an ordinary percussor could be employed with which to give the tapotement.

Besides these manipulations, which belong to the massage-method proper, MEZGER makes extensive use of passive movements and plaster bandages, in such cases where these are considered specially necessary."

GENERAL RULES FOR GYMNASTIC TREATMENT

Medical Gymnastics can successfully be used for a great number of affections, either alone or together with other remedies. General indications could be suitably given here, but I prefer leaving them to each group of diseases, when contra-indications can, at the same time, best be pointed out.

In Sweden, ever since LING's time, gymnastic treatment has principally been used for chronic diseases, but latterly it has begun to be used as an after-treatment for several acute diseases, not least amongst these being surgical affections, when the object is to restore lost or diminished functional power; also as an after-treatment for various internal complaints Gymnastics has come to the fore, even during the period of convalescence, as, for example, in some diseases of the visceral organs of the chest and abdomen. Swedish gymnasts abroad have gone still farther, or rather, gone quite too far, as they employ Gymnastics as the only cure for almost all diseases, such as fevers, infectious diseases, malignant tumours, etc.

GYMNASTIC PRESCRIPTION AND DAILY TREATMENT

In writing down a Gymnastic Prescription it is necessary, in choosing the movements, to take into consideration, not only the illness to be treated, but also the patient's age, strength, constitution, occupation, condition of life, and other

noticeable circumstances, just as when prescribing medicine or any other treatment. Gymnastic treatment may also require to be modified in accordance with other treatment given at the same time.

Very weak persons have at first only passive movements given them. In other cases active and passive movements can be alternated, whilst keeping to a gradual transition from the weaker to the stronger treatment. The greatest benefit from the treatment is gained, in most cases, if the daily treatment be so arranged, that an active movement on one part of the body be immediately followed by a passive, when during the passive movement the rest necessary for the active one can be obtained. In this manner, the proper amount of strength can be put into the active movement. No fixed, schematic 'Gymnastic Prescription' can in other respects be arranged because strict individualization is of the greatest importance.

If active movements are to be given to children, old or weak patients, the most trying ones, such as holding, hanging etc., should be avoided, but even in passive movements a suitable choice is necessary; for example, beatings, under the above-mentioned conditions, should not be given, but a hacking or clapping instead, as either of these will produce a sufficiently good effect.

In the Swedish system of Gymnastics, both in Pedagogical and Medical, this rule has always held good: that the movements in a daily treatment should follow each other in a certain order, so that several movements, affecting one and the same part of the body or some special organ, should not succeed each other immediately, but that proper change should take place in arms, legs, head and trunk movements, or, in other words, between the principal divisions of the movements themselves. Between these are arranged, when necessary, the more special and "depleting" movements, an abdomen-treat-

¹ A Gymnastic Prescription applicable in general is given when treating of constitutional affections.

ment, nerve-treatment, etc. The daily treatment should also always begin and end with a respiratory movement.

Under certain circumstances however, in my opinion, it remains of great importance that movements of similar effect immediately succeed each other. In writing a prescription for spinal curvature I like to arrange a group of 2—3 such movements, so chosen, that a progression from the weaker to the stronger is the result. Such a prescription will sometimes contain 2—3 similar groups, which are separated by some lighter active or purely passive movement. In treating some forms of spinal curvature the same movement may suitably recur 2—3 times during a daily treatment, as it is proved that a movement is performed better the second and the third time than the first. In such a case such movements are chosen that the patient performs best and that are of special effect.

Often too, it is necessary to let a passive movement on some part of the body be succeeded by an active one for the same part; sometimes the reverse. Here are two examples. When the patient's condition so allows, I like to order a double arm-heaving after chest-clapping. On the other hand, in cases of chorea, muscular spasms and similar complaints, each active movement is followed by a passive stroking on the part of the body treated, so that the patient may experience a soothing effect.

A daily treatment should, at first, consist of 6—8 movements, but as the patient becomes accustomed to Gymnastics and his strength increases, the daily treatment can consist of 10 or, at the most, 12 movements.

Some patients require a constant change of movements; would like to have what they see others take, or what they have heard would be nice, etc. As it can naturally be concluded that movements have been selected best suited to the special case, attention need not always be paid to the patient's wishes which are often mere caprices. If he find any special movement disagreeable, it can be exchanged for another or omitted, to be taken up again later on, if it play any important part in the case in question. One must often experiment

in this way, as well with Gymnastic treatment, as with other treatments. On the other hand, it not infrequently happens that patients with chronic diseases, always use one and the same prescription, when they are treated for longer periods or several times over, and have found the prescribed treatment beneficial.

How many times each movement shall be repeated is, in most cases, given in specifying the movements, or at least so often that proper guidance is gained from it by an accustomed gymnast.

A daily treatment should commence with easy movements and also end in the same manner, so that the strongest movements come in the middle of the treatment. The same holds good for each individual movement, which is generally commenced rather gently and is gradually increased in strength to be weaker again towards the end. It is necessary also, in every form of movement, to try to make the most of each, so that in the active movements and movements of resistance the furthest limits are approached, however, without too far taxing the patient's strength; the passive are given sufficiently long and powerfully, but so that all the time the patient may feel at ease, and the movements must also be given as agreeably as possible.

THE RESPIRATION DURING GYMNASTIC TREATMENT

Already in the first part of this work, in describing the movements, it has been pointed out on several occasions that in all Gymnastics it is of great importance that respiration should be properly attended to, both during the movements and the pauses; so for example, that inspiration takes place during chest-expansion or arm-heaving; on the other hand, that pauses for rest in breathing are made between every movement or even after every moment of a movement (for example in sit-lying-raising) that requires great exertion.

The gymnast must see that his patient respire properly, but, for his own sake, he should also think of his own respiration.

It often happens that a respiratory-movement is given after every other movement, passive as well as active. The former occurs when the patient suffers from scarcity of breath, depending upon heart-disease, lung-emphysema, or some other lung-disease; the latter whenever an active movement has been somewhat trying, so that the breathing has not been quite free. In the former case, a passive respiratory-movement is given; for example, a chest-lifting; in the latter case an active respiratory-movement; e. g., a double arm-heaving. This last-mentioned movement is specially used as a finishing movement, as it possesses the excellent qualities of being a good respiratory-movement and a good one for the general bodily bearing. It is consequently much given to children, especially in treating spinal curvatures, when it is intended that the patient, immediately after a corrective "scoliotic movement," shall at once take a good and proper bearing. The purely educative element contained in the system that young people, after every Medical Gymnastic movement, have to perform a free-standing one by command, has never been sufficiently appreciated.

AMOUNT OF TIME SUFFICIENT FOR THE GYMNASTIC TREATMENT

Sufficient time should be allowed, in order that the treatment, from beginning to end, can go on evenly and quietly and without unnecessary haste, so that each movement can have time to take effect, because otherwise the treatment cannot produce the effect intended, but will be of harm instead.

The patient should arrive 5—10 minutes before the treatment is to commence, so that there shall be no shortness of breath after the walk; this rule is especially meant for those patients who, from one cause or another, suffer from shortness of breath.

After every movement or group of movements, about five minutes' rest is taken, preferably in walking about slowly; a rather longer rest is allowed to weak and elderly patients, but comparatively speaking, even strong and young patients require this rest, so that sufficient force can be put into the following movement. That fatigue ensues after trying movements is only natural and, in several forms of illness, cannot be avoided; for example, after treatment for spinal curvatures, stiffness in the joints, etc., but this feeling of fatigue is purely physiological and passes away by the patient's resting in the prescribed manner after each movement and after the whole of the treatment, and for which more detailed orders should be given in different cases. The fatigue that ensues in otherwise strong persons after Gymnastic treatment generally gradually disappears after they have become accustomed to it and a feeling of ease is experienced instead. Should the gymnast notice an unusual degree of fatigue in a patient, this is a warning to him to proceed carefully, especially during the first period of the treatment, otherwise it frequently occurs that the patient finds the Gymnastic treatment less useful and agreeable and gives it up, however necessary and beneficial it may be.

It is necessary for weak patients to rest thoroughly—best in a lying position—after having undergone the daily treatment. If space and accommodation in the Gymnastic-hall do not allow of this, the patient must rest on reaching home. The advantage of so doing has probably been seen by every practising gymnast and at the same time he has experienced that better and quicker results are obtained, when a patient, during the course of a Gymnastic Cure, devotes all his time and attention to it, than when he attends to his usual work at the same time.

All the requirements given here, as regards sufficient time for, and sufficient rest during and after the treatment, can generally be complied with, when it concerns elderly and really delicate persons, but seldom by school-children.

Only 10 years ago a period of $1\frac{1}{2}$ —2 hours was considered necessary in which to undergo a proper daily treatment, but now-a-days one hour at the most is devoted to it.

It is best to take the Gymnastic treatment just between two meals, for it holds good here, as in all physical work, that it is not well performed on a fasting or on a newly-filled stomach. This is almost always a difficult matter for school-children, whether it be a question of Pedagogical or Medical Gymnastics, as the exercises must generally be taken at the beginning or end of their breakfast-hour, which is, on this account, shortened.

In making up a prescription for home Gymnastics it should be remembered, that the movements must be chosen and arranged so that the gymnast need not sacrifice an unnecessarily long time to them.

THE GYMNAST'S POSITION AND RELATION TO THE PATIENT

I have mentioned previously, in describing the Derived Gymnastic Positions on page 19, that the gymnast should see that the patient, in every passive movement, has as comfortable a bodily position as possible, and that during all movements a proper Gymnastic bearing be taken, but it is also of the greatest importance that the gymnast himself takes a suitable position in relation to the patient. On the one hand, the gymnast must not on any account inconvenience the patient in the slightest degree, but, on the other hand, he must be so placed as to be able to work freely, easily and comfortably, so that no unnecessary strength need be expended through an unsuitably chosen position. The gymnast should also practice the movements so that he can give them as well from the one side as from the other.

The gymnast and patient should not, under any circumstances, be engaged in conversation with others, during the

performance of a movement, nor should they carry on one between themselves otherwise than if demanded by the treatment itself, upon which they should have all their attention concentrated. That a disturbing effect in many ways might often be prevented if improvement in this direction could be made, goes without saying.—But there is no rule without exception, so also here. Sometimes it may be necessary for the gymnast to distract the patient's attention by some subject of conversation and so lead his thoughts to another subject than that of the treatment. This is especially the case in all treatment that necessarily causes pain, for example, in treating inflammation in the joints, in treating highly nervous persons, and many other similar cases.

The qualities required of a Medical gymnast have been mentioned on page 18. Here I only wish to add, that at the same time that the gymnast must do his work quietly and evenly, he should, on the other hand, be both cheerful, quick and active, and these three qualities should be easily discernible to the patient in the gymnast's general bearing and satisfaction in his work, the result of this being that the patient will also be contented with his treatment.

Times out of number have native, as well as foreign physicians expressed their great approbation of the good tone, vigour and briskness of movement prevalent in our Gymnastic-halls. That such circumstances as well as the treatment itself, should have a beneficial influence on the patient is only natural, and should easily be understood in our days, when almost all treatment is ascribed a suggestive effect. It is certain that a great number of patients prefer to be treated at a Gymnastic Institute than at home; but there are many also who hold a contrary opinion, and the character of their disease is often such that treatment of the same can best be managed at home.

Gymnastic apparatus are not, as mentioned on page 12, absolutely necessary to the practice of Medical Gymnastics otherwise than for curvatures of the spine, but the gymnast always works better if proper apparatus be at hand, and

the results of the treatment will be correspondingly improved.

It has always been a requirement, as well in Pedagogical as Medical Gymnastics, that no tightly-fitting clothes shall be worn during the exercises, but any special costume is not necessary for Medical Gymnastic Treatment.

DISEASES OF THE CIRCULATORY ORGANS

The experience, that diseases in the organs of circulation are favourably influenced by Medical Gymnastics has, ever since the introduction of Swedish Medical Gymnastics, been more and more acknowledged and spread abroad. This fact has also been gradually admitted, that disorders, not only in the functions of the heart, but also those in the more peripheral parts of the apparatus of circulation, in the vessels and capillaries, experience a beneficial influence from Medical Gymnastics. Consequently, this treatment has now commenced to be given for most diseases having their source in disorders of the circulation. It is frequently necessary, of course, that the treatment continue a long time and be often repeated, but this will also be the case with all other remedies for heart-diseases. Gymnastic treatment has however this advantage, that its effect will be more lasting than that of any other treatment.

A weakened circulation is the necessary consequence of every heart-disease, and the object of Medical Gymnastic treatment will therefore be *to facilitate the work of the heart by improving the weakened circulation*. This is best secured, in most cases, by diminishing the congestion in the venous system, and there are, fortunately, in Swedish Gymnastics three large groups of passive movements, that have a direct circulatory-furthering effect, namely:—

Kneadings, rollings and respiratory movements

Moreover, under certain circumstances, it may be necessary to arrange the treatment so as to urge the heart to increased action, of which more will be said below.

Muscle-kneadings and rollings further the circulation especially in the more peripheral parts of the body; respiratory movements do the same in the chest, and, indirectly, in the abdominal cavity also, for which the abdomen-kneading is specially of importance.

As the treatment of heart-diseases is one of the most important chapters in Medical Gymnastics, I shall try to give a short explanation of those movements belonging to the three groups mentioned above.

Muscle-kneadings. The circulatory-furthering effect of muscle-kneadings is explained in this way, that every pressure of a muscle causes the blood to be squeezed, as it were, out of the veins of the muscles in the direction toward the heart. In kneading the muscles the case is the same with the inter-muscular veins, and an active muscle-movement has, to a certain extent, the same effect, so that, when a patient's condition so allows, such movements are always prescribed. In treating heart-diseases only a muscle-kneading has generally been given, but in most cases I also give an abdomen-kneading.

Abdominal-kneading is given when requisite to influence the digestion, but even in the absence of disorders of the digestion in treating heart-disease I always prescribe an abdominal-kneading, because I consider that it is of considerable circulatory-furthering importance in heart-diseases generally, but especially in some valvular lesions of the heart when there is a venous congestion in the digestive apparatus. It should be remembered that kneadings and pressings are sufficiently strong to press together the veins, and thus further the flow of the blood to the heart, but, on the contrary, they do not offer any hindrance to the free course of the arterial blood. An abdominal-kneading is, as a movement furthering circula-

tion, of considerable importance even from another point of view. An abdominal-kneading causes a mechanical excitation of the *nervi splanchnici*, the consequence of this being, not only a contraction of the arteries of the abdomen, but also a contraction of the great venous-roots of the abdomen, the inferior vena cava and the vena portæ. According to *Levin's* researches referred to here below, an abdominal-kneading can reduce an over-excited action of the heart.

The rapid strokings that generally accompany kneadings are also of importance, as by the excitation they cause on the skin, a very extensive contraction arises in the vessel-system there, though a very temporary one, it is true.

The kneadings, advantageously used for heart-disease, will thus be:—

Arm-muscle-kneading, leg-muscle-kneading and abdominal-kneading

Rollings are reasonably called circulatory-movements in Medical Gymnastics. As is known, the veins hold more when they are lengthened through being stretched. In rollings, for example in foot-rolling, a frequently repeated elongation and shortening of the numerous veins that pass the joint takes place; each time a vein is thus elongated, the blood is sucked up from the peripherally situated tributaries, which, in their turn, react in a circulatory-furthering manner on the capillary-district of these branches; on the shortening of the veins which immediately follows they empty their contents in a centripetal direction. The same occurs on every rolling, and the oftener it is repeated, the greater and more lasting will be the effect. The Gymnastic-rollings are:—

Hand-rolling, arm-rolling, foot-rolling, leg-rolling, head-rolling, trunk-rolling and circle-rolling

All these movements can be used in the treatment of heart-diseases. Rollings are generally given as passive move-

ments and they are always given as such for heart diseases. Each of the above-mentioned rollings will further the circulation by the stretching effect it has on the veins, and this not only on the vessel-district lying peripherally, but also on that situated centrally in respect to the joint in which the passive movement is performed. Of special importance are rollings in the shoulder- and hip-joints because a strong suction arises in the great veins lying near these joints. In consequence of fasciæ (the so-called venous-pumps), which are slightly attached to the veins, being tautened by these rollings, circulation is further improved.

Head-rolling facilitates circulation in the great venous-district of the head and neck. This movement should, however, be gently given, i. e. the rollings should not be extensive, and it should not be given long to heart-patients, at least not until the other movements have been given some little time and it has been proved that they can be borne. Head-rolling, if not given with the above-mentioned precautions, can easily cause fainting and dizziness. If the movement can be borne, it has certainly a very beneficial effect, perhaps mostly so on patients disposed to congestion of the head.

Trunk-rollings principally influence the inferior vena cava, but to a slight extent also the superior vena cava. This greater influence on the inferior vena cava depends upon the fact that the rollings become greater in the lower part of the spine, on account of the greater mobility in relation to each other of the vertebræ in this region. In treating patients with heart-disease the precaution should be observed mentioned on page 141, that the trunk be not carried too far back in the trunk-rolling, because this position can over-exert the abdominal muscles and the respiration thereby be interrupted.

Circle-rolling is specially supposed to influence the vena portæ and its system, a supposition I feel bound to advance, because it is so frequently alluded to in Swedish Gymnastic

literature. I have, however, never seen any reasonable explanation of this, and it will not be easy to find one, because were circle-rolling to possess such an influence, trunk-rolling should possess it in a still higher degree, or at least in the same degree that the last-mentioned movement is larger than the former.

The influence of the respiration on circulation is probably sufficiently known, but I consider it necessary to briefly mention a few of the most important factors. The special task of respiration is to oxidise the blood, and as heart disease is always accompanied by a weakened circulation, the oxidation of the blood will be incomplete, in the same degree that the disease of the heart is severe.

On this account it is of the greatest importance to give heart-patients as many respiratory-movements as possible and to teach them to make their respirations as deep and complete as they can, not only during the course of a Gymnastic treatment, but also at other times.

The chest does not only pump air, but it also serves as a blood-pump, because deep respirations further the circulation; this especially relates to the lesser circulation, or the passage of the blood through the lungs. But respiratory movements also influence the greater circulation in the great *veins*. Inspiration increases the negative pressure in the chest, by which a strong attraction of blood to the heart (the stronger the deeper the inspiration is) arises in both of the *venæ cavæ*. Another influence, furthering the circulation that respiratory-movements cause, can also be mentioned, namely that the diaphragm, in contracting during respiration, expands the inferior vena cava and by simultaneously exercising pressure on the abdominal organs, presses the blood from these into the veins.

The attraction of blood to the heart that arises in the superior vena cava through inspiration, reacts, in its turn, not only on the larger veins of the upper half of the body, but also on the ductus thoracicus and the lymphatic-vessels.

The ordinary respiratory-movements, used for heart disease, are:—

Chest-lifting, chest-expansion and arm-liftings

Besides the above-named movements, which all favourably influence the circulation, there is in Medical Gymnastics another group of passive movements, which have a soothing effect on an over-excited activity of the heart. Such movements are:—

Chest-lift-shaking and back-tremble shaking

*Zander*¹ says, "that there is a movement in Mechanical Gymnastics, which has quite a specific influence in diminishing an over-excited action of the heart, viz. **back-trembling**, which is done with his apparatus F. I."

Hasebroek has made more extensive researches in this direction and confirms *Zander's* observations.

Chest-lift-shaking and back-tremble-shaking in Manual Gymnastics are the movements that nearest correspond to the back-trembling of Mechanical Gymnastics, and they have always been used for the above-mentioned purpose.

Local heart-treatment, given as

Hacking, clapping, tremble-shaking, stroking

has, in addition, always been considered to exercise the same influence on the heart as the trembling-movements mentioned above. Possibly a still greater advantage may be attributed to the local heart-treatment, because, in most cases, these movements can, as occasion requires, exercise a soothing or stimulating influence on the action of the heart. But here the possibility of a psychical influence from the local heart-treat-

¹ Nord. Med. Arch. 1872, Vol. IV, No. 9, p. 12.

ment must not be excluded. The effect depends, in a very high degree, upon how the treatment is given by different gymnasts, but there is every right to presume that such an outward, purely mechanical excitation can have a reflex influence on the action of the heart through the nervus vagus and accelerans. The exact process here is, as yet, far from being clear, and, as far as I know, *Levin*¹ is the only one who has hitherto devoted much attention to it. The local heart treatment is generally given in a more mechanical manner, so that, in each case, both heart-hacking, clapping, stroking etc. are given. As I have seen in a great number of cases, that by stroking and tremble-shaking an increased action of the heart can be diminished 10—12 beats, and that, on the other hand, a too slow action of the heart can be increased by heart-hacking and clapping, I have always endeavoured to use the treatment according to the different kinds of heart disease in this respect. But as there are some patients who cannot bear these two last-mentioned movements, since they sometimes cause pain and oppression over the chest and especially around the heart, it is best not to compel them to take movements that are not felt to be of benefit. But, by going carefully to work, one can as a rule, after a few days renew those movements that at first seemed disagreeable but which one knows to be good for the special case treated.

Levin, by counting the pulses of all his patients suffering from organic heart disease, during a period of 10 years, has been able to draw certain conclusions, which ought to be generally accepted, as they express the average for over 6,000 pulses. The conclusions to which *Levin* has come are principally the following:

- 1) *that the pulse always sinks during a rational treatment,*

¹ Bidrag till kännedom om sjukgymnastiska rörelsers inverkan på rytmen vid organiska hjertfel, af *Astley Levin*. Tidskrift i Gymnastik. Stockholm 1892.

- 2) *that the pulse, if treated for a longer time, gradually sinks, to again rise when the treatment ceases, etc.*
- 3) *that certain movements have proved themselves to be pulse-diminishing :—*

Heart-tremble-shaking	8—12	pulsations	per	minute.
Chest-lift-shaking	9—10	"	"	"
Abdominal-kneading	8—10	"	"	"
Back-tremble-shaking	7	"	"	" . etc.

From what has been said above it should be clear that one and the same treatment ought to be applicable for nearly all kinds of heart disease, because in every case the principal object is to facilitate the work of the heart. All the passive movements now mentioned facilitate circulation in the venous and capillary systems and cause, at the same time, a more even and better division of the blood-mass through the whole organism. Passive movements are therefore of the very greatest importance in the treatment of heart disease, but some active movements also, if properly arranged, work in the same direction. In arranging a treatment for heart disease therefore, passive movements only should be used to begin with, and then, gradually, as the patient's condition allows, one or two easy active movements could be added, as:—

Hand- and foot-flexion and extension, knee-flexion and extension, forearm flexion and extension.

That leg-movements, in treating heart disease, are those the patient can best tolerate amongst active movements, is a fact that has never been denied, and it agrees very well with the importance and use of the *Oertel* cure. I have almost daily occasion to confirm that heart-patients tolerate such movements as:—

Leg-updrawing and stretching outwards, leg-twisting, leg-abduction and adduction,

long before they can tolerate corresponding active arm-movement. In more severe cases of heart disease therefore, it is best never to give other arm-movements than kneading and rolling; in arm-rolling, the precaution must be carefully observed that the arms should not be raised higher than to the horizontal plane of the shoulder-joints.

The last-named movements, together with others of a similar effect, are often generally called *depleting-movements*. The explanation of the useful influence of these upon heart diseases must be, that the vessels belonging to the working muscles, require more blood while the active muscles work and so take this from other congested parts of the body, while at the same time the active work of these muscles does not demand increased work of the heart itself, it being a fact that the vessels of a muscle expand when the muscle works, by an impulse from vaso-dilator nerves. This impulse is simultaneous with the innervation of the muscle from the motor nerves. The active leg-movements thus further venous circulation in the same manner as the corresponding passive movements, and become, by causing vascular dilatation, what they have, for a long time, been termed in Swedish Medical Gymnastics, *depleting*; they, so to say, unload the heart.

When the muscles work, certain substances are formed that pass into the blood and stimulate the respiratory centre to greater activity. The increased breathing which is the necessary consequence of this, furthers, in its turn, circulation. The circumstance that active leg-movements are much sooner borne by heart patients than the corresponding active arm-movements, should be explained by the fact, that arm-movements can, to a certain extent, render respiration more difficult, which is not the case with leg-movements.

Even in treatment with active or resistance movements, the result will be the same as in the passive, that is, they will

be better and more lasting in the same degree that the treatment is often repeated; in the active movements, under certain conditions—for example, in cases of fatty infiltration of the heart—this additional result will be gained, that the effect will last longer and be greater the more the movements can be increased in extent and strength. As a general rule the following should hold good in treating heart disease with Medical Gymnastics: that the treatment should be taken frequently—at least once a day and then for at least one hour, and that it should continue for a long period; at least three months. That this method of procedure is the only proper one is clear from some of the cases of illness described here below.

Since the action of the heart, as has already been frequently pointed out, is facilitated through Medical Gymnastics, a diseased heart should, to a certain extent, be improved by the treatment. This ought especially to be the case in diseases of the muscles of the heart, which latter are strengthened by the treatment. But even in valvular lesions symptoms of failing compensation can be diminished by the gradually increased work given the heart. Heart-dilatation should also be diminished by facilitating the work of the heart-muscle. But even if a Medical Gymnastic treatment can in no case free the patient from heart disease itself, and only in few cases improve it, still I dare assert, on account of the experience I have gained in the course of several years, that every patient with heart disease will obtain relief from the troublesome symptoms of palpitation, shortness of breath, pain and oppression over the heart, with other symptoms that always accompany heart disease, and even this is much to be thankful for. It is true that the improvement will not be lasting in every case, but that it must be often repeated, and for long periods, but it should also be remembered that the disease is chronic and that no other treatment gives better results. I know several heart-patients who, year by year, continue to take Medical Gymnastics, and, just on this account, are able to keep up and continue to be hard-working people, when other-

wise they would be condemned to an inactive life, often, perhaps, to a constant sick-bed.

The so much praised treatment of heart disease by the Oertel "*terrain-cure*" should not be passed over here, as, in its quality of being a purely mechanical remedy, it is somewhat closely allied to Medical Gymnastics. As is known, the cure for heart disease is supposed to improve a weakened circulation by walking in more or less steeply ascending roads, thus consisting exclusively in active leg-movements; to which is added, certainly an important, but quite too prominent a moment, that the walk shall take place in the open air. As far as I can correctly judge, the Oertel-cure should be good especially for fatty infiltration of the heart and some kinds of heart-neuroses, but not for more severe valvular lesions. I have, for several summers, had occasion to compare the effect of Medical Gymnastics and the Oertel-cure, and hence am justified in restricting the latter to the above-mentioned affections. In some cases I have given both methods of treatment simultaneously, which is probably useful if it can be managed. One great advantage in Medical Gymnastics is that the kind of treatment, number of exercises and their duration can be so minutely prescribed, and that the treatment can be constantly superintended and its effect seen, this being absolutely necessary in more severe cases of heart disease. Moreover, Medical Gymnastics, at least the manual, can be given and successfully to patients confined to bed. The number of heart-patients I have been able to put on their legs through giving them a Medical Gymnastic treatment, is not inconsiderable and this after they have been confined to their beds for several months and medicinal treatment has proved to be of little or no use. In such cases it would be of little use to prescribe the Oertel-cure. Finally, it should perhaps be pointed out that Medical Gymnastics, as well when it is a question of treating heart disease as any other illness, does not exclude a simultaneous use of medicinal treatment, and that it is often necessary to employ both in order that the patient may obtain the greatest possible benefit.

Possibly some may reproach me for not having illustrated the results advanced with pulse-curves, which would have been an easy matter. They are omitted for this reason, that my work is principally addressed to gymnasts, who, in general, are not competent to solve a pulse-curve. I refer those physicians, who desire such confirmation of the effects of Medical Gymnastics, to *Hermann Nebel's*,¹ particularly in this respect, excellent work. Besides I know very few who can properly solve a pulse-curve, but frequently gymnasts attempt to treat their patients by "suggestion," by taking sphygmographical tracings. It has really happened, that heart-patients have come and asked, if we "treat" with pulse-curves. Further, every foreign physician, visiting the Institute, is first and foremost interested in the treatment of heart-patients and especially the taking of sphygmographical curves, and they like to take such away with them, as a souvenir, from the Institute. Of late years it has gone so far, that the taking of pulse-curves—in the Gymnastic world—has been looked upon as a proof of scientific ability; if the curve can be solved or not is of minor importance! It appears quite natural to me however, that a practising physician ought better to be able to judge the patient's condition by auscultation, percussion and the ordinary simple examination of the pulse, than by the taking of sphygmographical curves, but this last-mentioned method of procedure is a purely technical one, which is easily learned and which is much simpler than any other physical examination.

That a non-medically educated gymnast, who is not acquainted with physical diagnostics generally, should desist from taking pulse-curves, is, of course, quite clear. The attentive gymnast finds all the same a sufficient number of other signs, both subjective and objective, of the improvement, continuation or further development of the illness in the patients he treats.

¹ *Bewegungskuren mittelst schwedischen Heilgymnastik. Wiesbaden, 1879.*

In what I have said above I have not, of course, meant to oppose the purely scientific and even purely practical significance of pulse-curves in the hands of those who can properly understand how to judge them, but only an unjustified use of the same.

Among *acquired heart diseases*, valvular affections must be reckoned first. Of such I have always many for treatment, mostly *mitral incompetence*, in some cases together with *stenosis*; further *aortic incompetence* and not infrequently, *combined valvular lesions* i. e. both in the mitral and aortic valves. I shall here pass over the different symptoms that accompany the different lesions and refer in this case to the general textbooks; a number of the most usual heart diseases can daily be observed at our Gymnastic Institutes. A case of mitral-incompetence is described on page 179, besides several cases in connection with other illnesses. As an example of a Gymnastic prescription for patients with valvular affection, the following treatment can serve:

- 1) **Half-lying double foot-rolling.**
- 2) **Yard-sitting double arm-muscle-kneading.**
- 3) **High ride-sitting circle-rolling.**
- 4) **Half-lying double leg-muscle-kneading.**
- 5) " " **chest-lift-shaking or**
 Arm-lean-standing back-tremble-shaking.
- 6) " " **Leg-rolling.**
- 7) " " **Abdominal-kneading.**
- 8) " " **Heart-tremble-shaking and stroking.**

Sitting chest-lifting after each or after every other movement.

In very severe cases, as, for instance, for patients confined to bed, it will at first be sufficient to give

- 1) **Hand- and foot-rolling,**
- 2) **Kneadings of the extremities and the**
- 3) **Local heart-treatment.**

I have frequently made use of this treatment and found it quite sufficient. The other movements are put in by degrees one at a time, just as the patient's strength so increases that his condition allows of it. If the treatment be given as here described, it in almost every case exercises this influence on the action of the heart:—that it becomes slower and more even, facts that are best observed by counting the pulse before, during, and after the treatment. To allow heart-patients to count their own pulses is, as a rule, productive of more harm than good, and this applies also during a Medical Gymnastic treatment. As the action of the heart in most valvular affections is increased, it is of importance to calm the same, and this is best done by a chest-lift-shaking, back-tremble-shaking and the local heart-treatment, practised as tremble-shaking and stroking. It is not necessary to give more particular and detailed movement-prescriptions for the different kinds of valvular affections, because individualization is perhaps more important here than in any other malady, so that anyone incompetent to judge heart-disease, acts most wisely in desisting from treating the same.

Of *congenital heart disease* I have had a few cases to treat, of which one is of special interest because it has been observed and treated at an infirmary. It was in the spring of 1881, that I had occasion, under the direction of the then Head Physician, Professor *O. V. Petersson*, to treat the patient, at the Infirmary in Upsala, with Medical Gymnastics.

Diseases in the muscles of the heart. Dilatation of the heart often occurs together with valvular lesions. A properly arranged Medical Gymnastic treatment can be of use in such cases, still more than for valvular lesions alone, especially during the time the dilated heart has a greater need of help, i. e. before the muscles of the heart have had time to be hypertrophied, so that it can effect a greater development of

strength, and thus compensate the dilatation. For the heart to hypertrophy is an absolute necessity in dilatation and is one of nature's expedients to help herself or to regulate a defect which has arisen. Movements furthering circulation facilitate, as has before been said, the work of the heart to a considerable degree, and by means of these the blood-mass in the arterial and venous systems is more evenly distributed, and the blood pressure will, at the same time, be more normal. Medical Gymnastics compensate the dilatation to a certain degree. This is best proved from the fact, that the venous stasis, and the symptoms depending thereon that generally accompany an uncompensated heart disease are diminished or disappear in consequence of the treatment.

I have, in many cases, seen a diffused cyanosis, shortness of breath, œdema in the legs, and in some instances even albuminuria, disappear after only a fortnight's Gymnastic treatment. One case to prove this can be given.

Organic heart disease, mitral incompetence with dilatation of the right ventricle in a man 45 years old, treated 1889 and 1890.

He had a strong and good constitution, had not had syphilis, but for many years had consumed much spirit. Heart disease had arisen after a lingering and severe rheumatic fever, which he had suffered the previous year. Symptoms of heart disease had gradually increased, with shortness of breath on the least exertion, and a troublesome cough. On his consulting me in the summer of 1889 a noticeable enlargement of the heart dulness to the right and obvious auscultatory signs of mitral incompetence were observed. Besides the above-mentioned symptoms, cyanosis, œdema in the lower legs and albuminuria were present. Gymnastics were given daily and a bath every other day. Improvement soon commenced, so that œdema and albuminuria had disappeared after 2 weeks and all the other symptoms were much less troublesome. He continued the treatment for 6 weeks in all, when subjective as well as objective symptoms were considerably improved. Baths as well as medicinal treatment had been tried before without any improvement, so that the good results now gained should be attributed to the Gymnastic treatment.

The patient returned for another treatment in the summer 1890, when a slight change for the worse had taken place. Treatment was given as in the previous year and improvement was soon noticed. I have not since then heard anything of this patient, but I have observed many

similar cases and I am persuaded that Medical Gymnastics is of the greatest importance, during the time that the compensation of heart disease develops itself.

In dilatation of the heart, a slight differentiation in the gymnastic treatment ought to be made, so that the above-named movements on the extremities should principally be used for dilatation and failing compensation of the left half of the heart, and, on the other hand, respiratory movements for similar conditions in the right half of the heart.

Hypertrophy of the muscles of the heart. Heart-hypertrophy is an illness that much interests school-gymnasts and school-physicians, because, according to their observations, it often occurs during school years and is most frequently considered to necessitate exemption from Gymnastics.

Lennmalm says in his work "Om idiopatisk hjerthypertrofi och hjertdilatation,"¹ that Idiopathic (pure, primary) heart-hypertrophy is a form of sickness, whose right to existence has been the subject of much discussion, but that, by the term, is generally understood an enlargement of the heart which has arisen, without any of the ordinary and well known causes being observable as grounds for the same. The author points out, that the muscle of the heart undergoes hypertrophy when increased demands are made upon its working capacity, but only under two given suppositions, namely, that the increased demands do not exceed a certain limit proportionate to the strength of the organ and that the condition of the organ is on the whole, such, that it can effect such a process as hypertrophy. In other words, a pretty healthy constitution is necessary if heart-hypertrophy is to be brought about."

Further, the author tells us: "that, during a certain period of life, namely during the pubescent period, heart-hypertrophy is, one might almost say, physiological."

¹ Upsala läkareförenings förhandlingar 1888, Bd. XXIII, 6 n. 7.

I think I have remarked that school-physicians are generally too prone to make the diagnosis heart-hypertrophy and to set down the origin of the same to school-gymnastics. As specially concerning heart-hypertrophy and dilatation in respect to Gymnastics, it seems that, according to what has been printed out here, too strong Gymnastics can be the origin of these affections. But, on the other hand, we know, that well arranged Pedagogical Gymnastics, and especially Medical Gymnastics, can cure an already existing heart-hypertrophy.

Pedagogical Gymnastics, according to *Ling's* system, should, however, seldom constitute the ethiological moment for these forms of heart disease, at least if the Gymnastics be given according to the rules laid down for our schools; on the contrary, several of the athletic exercises now so popular and diligently practised could easily cause heart disease. This, in my opinion, especially holds good for bicycle-riding, skating, and "sparkstötting-sport," particularly when they are practised for exhibition and matches. Examinations of the heart are not made immediately after the matches, which would be interesting to do, but the consequences of the over-exertion cannot fail to be there even if they do not show themselves at once. I consider, therefore, that every physician having the health of children and youths confided to him, should always dissuade them from participation in the all too frequent competitions. In Medical literature there are many cases of idiopathic enlargement of the heart originating from over-exertion. It is obvious that the passive movements of Medical Gymnastics, so often spoken of already, which facilitate the work of the heart, should act beneficially in cases of idiopathic heart-hypertrophy. The reason why I think that the diagnosis heart-hypertrophy should not always be so quickly given is that, the idea ever after remains in the patient's mind, that he has heart disease. The same applies to every diagnosis relating to the heart, and the strange part of it is, that most people, not to say *all*, rather believe in him, who through his diagnosis gives them a disease of the heart, than in him who

releases them from it; even if the former be medically uneducated and the latter a medical authority.

Fatty infiltration of the heart arises, as is known, through an increase and diffusion of the fat normally found in the heart. This is generally the case with most persons who suffer from too good living and consequently from general obesity. They are troubled with palpitation of the heart which comes on without any reason as it seems, i. e. independently of bodily exertion, not unfrequently after meals, often during the night and always together with orthopnœa (=difficulty in breathing), at times resembling asthmatical attacks. When such symptoms are found and no other affections of the heart can be discovered, a thorough Gymnastic cure is justified whether the physical examination proves the existence of fatty infiltration of the heart or not; the diagnosis fatty infiltration of the heart is far too often given just as the diagnosis, heart-hypertrophy; this is, at any rate, the case in Sweden.

In more severe cases of fatty infiltration of the heart the treatment is commenced with principally passive movements, but passes over as soon as possible to the active ones, and in this case larger and more exerting movements than for other kinds of heart diseases, because if ever one can be justified in urging the heart to increased activity by giving active movements, it is just in cases of fatty infiltration of the heart. If also the local heart-treatment be arranged in the same manner, it will be seen from the commencement of the treatment that the action of the heart will be more even and stronger. I have previously said that the Oertel-cure is suitable to use for fatty infiltration of the heart, but alone it is too one-sided, and in more severe cases cannot even be employed, when, on the other hand, by a combination of passive and active Medical Gymnastic movements the work the patient has to do can be very accurately determined and thus the results sought for can be obtained. It must, however, be admitted that the Oertel-cure greatly supports the Gymnastic treatment for fatty infiltration of the heart, not only by means of the terrain-

cure, but perhaps as much through the desiccation-cure (=drying-out cure) prescribed in connexion with it by Oertel, because if patients, with fatty infiltration of the heart, do not, at the same time, diet themselves, not even Medical Gymnastics can cure them.

The Gymnastic treatment should, however, be continued for some time even after it is thought fit to stop the emaciation-cure, just to strengthen the weakened muscle of the heart.

A Gymnastic prescription for fatty infiltration of the heart can be given here.

- 1) Heave-sitting chest-expansion.
- 2) Half-lying knee-flexion and extension.
- 3) Yard-sitting arm-twisting.
- 4) Standing chest-clapping with double arm-heaving.
- 5) Half-lying leg up-drawing and out-stretching.
- 6) Sitting arm-rolling or forearm flexion and extension.
- 7) Ride-sitting trunk-rolling.
- 8) Half-lying heart-hacking and clapping.
- 9) Heave-sitting chest-expansion.

After each movement, Standing double arm-heaving.

To very weak patients during the first days of the treatment those movements can be given which are prescribed for valvular affections (see page 177).

Cardiosclerosis and Chronic Myocarditis

Although it is extremely difficult, and in many cases almost impossible, to give the above diagnosis, these forms of disease are treated of, partly because they frequently occur, partly too, because they have previously been included in handbooks on Medical Gymnastics, for example by *Hartelius* and *Nebel*. It often happens that patients, under this diagnosis, are advised to undergo a gymnastic treatment. The symptoms change almost endlessly, but the most characteristic

are: palpitation of the heart together with pain in the region of the heart, usually radiating from the left side; further a very slight and irregular breathing, so that interruptions take place during the utterance of quite short sentences, and that orthopnoea arises from quite slight bodily exertions, for example, taking a few steps, so that such patients must continually stop to take a full breath and to cough, bronchial-catarrh often accompanying this illness. There is venous stasis in the abdominal organs, almost always causing disorders in digestion.

As the illness occurs in elderly people, generally in men, the effect of Medical Gymnastics is more of a symptomatic than a curative character, but even if only alleviation in the symptoms can be given, much is already gained; that this does occur, is best proved by the fact, that so many patients visit our Gymnastic Institutes some months every year to obtain help for chronic myocarditis. In rather a good many instances, I have even seen improvement in the presence of all the above-named symptoms, although the treatment has only lasted one or two months each year. The effect of Medical Gymnastics can thus, in many cases, last much longer than the treatment itself.

To diminish the venous stasis in the lungs, a large number of respiratory movements can be given, chest-lift-shaking is especially well tolerated; for stasis in the digestive organs abdominal-kneading is given. The treatment can in other respects be carried out as is given for valvular complaints. One case, in which the Gymnastic treatment showed quite a manifest improvement, may be given here.

Chronic Myocarditis in a man, 66 years old, treated in the years 1889, 1890 and 1894.

This patient, at the age of 41, had hemorrhage from the lungs several times but, both before and after that time, had enjoyed good health, until at the age of about 65 he commenced to be troubled with the above-named symptom. When, in 1889, he came to be treated, he suffered much from palpitation of the heart and shortness of breath on the slightest exertion, as also from disorders in digestion. The action

of the heart was insufficient, irregular and intermittent; the heart sounds weak and dull.

A month's Gymnastic treatment considerably improved the condition so that the patient could walk pretty well, and so that he could commence with the Oertel-cure, which was well tolerated and still further improved the condition. He returned for continued treatment for a month, during the years 1890 and 1894. He has since that time been well and is not noticeably short-winded; he can easily walk 20 kilometres although he is now 75 years old.

Neurosis of the Heart frequently occurs, and many different kinds of it are mentioned in Medical Hand-books. The most common form is probably

Nervous heart-palpitation, by which is meant a quick and usually a strengthened action of the heart, which comes on but occasionally, alternating at intervals with a normal action, and without its being possible to discover any organic change in the heart. Not infrequently such a palpitation occurs together with hysteria or neurasthenia, or else some other real illness is the cause of it.

Intermittent action of the heart appears sometimes after physical or mental over-exertion, after nicotine-poisoning, or in old age and shows itself in this way, that one or two contractions of the heart, and consequently one or two pulsations are not made, on which pain is sometimes felt in the region of the heart. This illness is not of great importance. Many people have intermittent action of the heart without experiencing the slightest unpleasantness from it.

Neurosis of the heart can also appear as *neuralgia of the heart*, characterised by paroxysmal-like attacks issuing from the region of the heart or lower part of the breast-bone and radiating along separate nerves as a pricking, boring, burning pain. Such attacks of pain appear without any cause, often just when falling asleep at night. The attack is preceded or accompanied by nausea, giddiness, singing in the ears, pricking and creeping of the skin etc. Most frequently the attacks are accompanied by severe palpitation, orthopnoea and cramp;

they may last minutes or hours and are extremely painful. In most cases there must be diseased alterations in the myocardium or in the coronary vessels as the origin of the so-called neuralgia of the heart; although these alterations are difficult to diagnose. There is no right to hope that gymnastics, in this so-called symptomatic form, can do much good, for the prognosis will, under all circumstances, be very bad. If, on the contrary, hysteria or some similar illness is the cause of the complaint, the prognosis is better.

Basedow's disease is also referred to neurosis of the heart. It is recognized by a very rapid action of the heart, the swelling of the thyroid gland and by a protuberance of the eye-balls from the sockets. The increased action of the heart is occasionally connected with organic changes in the heart.

Medical gymnastics is also given for neurosis of the heart and can generally do as much, or as little good as other remedies, unless the original cause of the suffering can be discovered and attacked.

If heart disease can reasonably be suspected as the cause of the neurosis, the treatment is accordingly arranged for palpitation and intermittent action of the heart. I have seen weak movements of resistance or even easy free-standing active movements useful, as was also the Oertel-cure.

In some cases of Basedow's disease I have observed Medical Gymnastics to be of no use; even when only quite small passive movements have been given, it has seemed as if Medical Gymnastics could not even be borne. But it is always so, that if these patients with neurosis of the heart do not at once feel relief in their symptoms, they soon stop the treatment, so that it has been difficult to judge its effect. In other cases again, Medical Gymnastics seems to do good even in morbus Basedowi, especially if real heart disease exist. In some patients with this illness, who have suffered from non-menstruation, a marked improvement has taken place when menstruation returned through taking Medical Gymnastics. A slow and light effleurage on the throat and circle-strokings of the eyes

have, in some instances, been tried and, as it seems, successfully.

He who has had the patience to read the description of heart-diseases to the end, will possibly gain the idea from my statements, that I have too prominently pointed out the importance of Medical Gymnastics in the treatment of heart diseases; but I must then beg to add that I have yearly about 100 heart-patients to treat and that, in nearly every case, I have seen good results from the treatment. If such results are not obtained through Medical Gymnastics, I venture to say that the treatment is not continuous enough, first as concerns the time for each special day's treatment, and then as regards the length of the treatment counted in months or years—provided, that is, that the treatment be properly arranged and carried out.

A few affections belonging to the vascular system, for which a Medical Gymnastic treatment is suitable, may briefly be mentioned.

Bleeding at the Nose has long been treated by Ling's school with nose-root-shaking and stoop-movements, which are considered to have quite a specific effect on this complaint. As nose-bleeding is generally only a symptom of some other illness, the cause of the illness should in every case be investigated. It is therefore always best to consult a nose specialist before proceeding to apply a treatment. If nose-bleeding be caused by heart disease, the treatment can be arranged, with the greatest hope of success, as for heart disease, without at all giving the so-called specific movements, which, in some cases, may be of more harm than good.

The treatment of *Hæmorrhoids* could be most suitably given under the head of diseases of the digestive apparatus, and more will be said of it there, but a few cases may be

briefly mentioned here, as bleeding frequently occurs in hæmorrhoidal-complaints.

Bleeding hæmorrhoids in a man, 45 years of age, treated 1894 and 1895. The case treated and described by Doctor *Astley Levin*.

The patient had suffered from hæmorrhoids several years, and sometimes from bleeding ones. On the commencement of treatment in January 1894 he had for some time been troubled extremely with large swellings which bled at every purgation, and which, further, were extremely painful. On examination, a ring of red-blue lumps, varying in size from that of a hazel-nut to a walnut, were found all around the anus; some were raw, and all extremely tender. I advised an operation, but he being afraid of this and wishing to try some other treatment first, I began to give him external treatment with *Liedbeck's* vibrator. After two applications the tenderness was already so diminished that digital examination did not cause any great pain and the swellings were then found to extend about 6 ctm. above the opening of the anus. At my request *Liedbeck* then procured a finger-long and thin contact of aluminum and by applying inward treatment the patient's condition afterward improved very quickly, so that in less than a fortnight he was, for the time being, relieved from all unpleasantness, and no swelling could be either seen or felt. A slight relapse in March 1895 was treated successfully by merely 3 or 4 manipulations.

Bleeding from the rectum in a man, 63 years of age, treated in 1895.

The bleeding had not been considerable but continued daily for some weeks without any cause being discovered. It was quite obvious that the bleeding came from the mucous membrane of the rectum, although no dilatated veins could be discovered either by inspection or palpation. The bleeding generally occurred with defæcation, but also independently of this. The defæcation was somewhat slow, the digestion good and the well-being of the patient not otherwise disturbed, but he became, eventually, uneasy on account of the constant bleeding. Professor *J. Berg* was consulted and advised a Gymnastic treatment. This consisted solely of external *anal-massage with rod* (see page 63) and *leg-rolling*. The bleeding ceased after the first treatment 21/10 1895, and after 5 days the patient began to treat himself. He continued for some time with the anal-massage. The bleeding returned in February 1896, but ceased again after a few days' treatment.

The consequences of *venous thrombosis* are treated, and successfully, with Massage and Medical Gymnastics, but

the treatment requires very great care, so that it ought really only to be given by specialists. From whatever illness the thrombosis may have arisen, an attempt should be made to remove the remaining symptoms of œdema, oppression and fatigue, together with the accompanying difficulty in using the extremity affected. Even as regards the treatment of venous thrombus, I refer those interested to an article¹ previously published.

Some cases of *senile gangrene* might most probably be cured by a Gymnastic treatment. Hitherto I have only had occasion to observe a few cases, but these certainly encourage further attempts. The explanation of the effect of gymnastics here is, moreover, very simple. When mortification sets in on account of disturbed circulation, movements furthering circulation must, of course, work effectually; take for example, passive foot-rollings on the commencement of mortification in the foot. That the circulation in the foot will become more active by a passive foot-rolling can both subjectively and objectively be understood by the increased warmth of the foot. But an improved circulation occasions also an increased nutrition and by means of this an incipient mortification can be stopped in its development. A case fully proving this may be given.

An incipient *gangrene* in a woman, 81 years of age, treated in 1894.

The patient had no special complaint, but a number of senile changes, weak and poor action of the heart, calcareous degeneration in palpable arteries etc. She was up daily, but had not been able to stand nor walk during the few preceding weeks, as she had commenced to be troubled with a constant and severe pain in her feet. The left foot had become somewhat swollen, and the toes and adjoining part of the foot had assumed a blue-red colour; there was a blister on the heel so that the epidermis was rubbed off. No formation of a thrombus in the larger vessels was found and no swelling of the leg. Such was the condition when the treatment,

¹ Massage och gymnastik såsom efterbehandling vid ventromb, af A. Wide. Tidskrift i Gymnastik. Stockholm 1890.

with often repeated **foot-** and **toe-rolling**, **-flexion** and **-extension**, commenced to be given; whereupon the pain and ache in the feet gradually disappeared. The feet felt warm after each treatment, so that a distinct improvement was the result. The excoriation healed pretty quickly and the patient commenced to walk. A change for the worse has sometimes taken place during the last few years, but the same treatment has again brought improvement, and the condition is comparatively good this year, 1898.

It may be said that, even in this case, it cannot be fully proved that the treatment given produced the improvement obtained; to this I can only answer, that other treatment, previously used, had effected no improvement at all. Besides I have never entertained the opinion that a gymnastic treatment can be of assistance in every case. It is, on the contrary, contra-indicated when circulation is impeded; but when circulation is only weakened, and when mortification therefore begins to set in, movements furthering circulation should, in certain cases, cause at least temporary improvement, and even by that something at least is gained.

DISEASES OF THE RESPIRATORY ORGANS

Swedish Pedagogical Gymnastics is, in itself, of importance as a prophylactic medium in most diseases of the chest and it powerfully supports other prophylactic treatment. This circumstance I have had occasion to observe in my practice as School and Gymnastic Physician, and every Physician who devotes his attention to the matter, will certainly be able to make similar observations. Medical Gymnastics is, in a still higher degree than Pedagogical, of prophylactic importance in diseases of the chest, because it can more directly be arranged so as to expand a sunken-in chest, make a shallow respiration normal and the interchange of air as complete as possible, at the same time that the respiratory muscles become strengthened through the treatment.

Diseases of the respiratory organs can be influenced by several groups of Gymnastic movements, of which the most important are here given.

1) *Movements influencing the respiratory-mechanism*, so that the breathing will be fuller and deeper, at the same time that the chest becomes expanded, by means of which circulation in the lungs will also become more active.

Amongst *inspiratory-movements* the following are the most important:

Chest-lifting, chest-expansion and double-arm-heaving;

amongst *expiratory-movements*

Side-tremble-pressing (see page 75) and chest-lift-shaking.

The first three mentioned movements expand the whole chest uniformly, but under certain circumstances, for example, in a sinking-in of the one half of the chest after an exudative pleurisy, this part of the chest must be more expanded, for which object the following movements should be given:

Chest-lifting in different planes, and side-flexion to the healthy side.

2) *Movements that facilitate expectoration* and help to loosen the mucus from the surface of the bronchial mucous membrane are:

Chest-tremble-shaking, -hacking and -clapping, given on the chest in its entirety, on either side, or only on the backs of very weak patients. These movements excite the respiratory-muscles, which in some lingering diseases of the chest, when the breathing is weak and shallow, would fall into a kind of atony, so that for this reason they should be excited to more energetic work.

3) "*Depleting*" movements that influence over-fullness of blood in the lungs. Such are, in the first place, **leg-movements**, both passive and active.

4) *Movements that make the chest more movable*, amongst which may first be mentioned:

Side-ringing, screw-twisting, trunk-rollings and alternate-twisting.

As is known, the chest, in emphysema, gradually assumes a changed form; it becomes more expanded and rounder, so that it is barrel-like. On account of the breathing being shallow, the chest, in time, becomes less movable, the costal cartilages harder and the chest in its entirety offers an increased resistance and becomes, as it were, ankylosed. All the movements last mentioned will make the different parts of the chest more movable in respect to each other. Moreover, these movements are not only used for emphysema, but in every case where increased mobility of the chest is required, as in flat-chest and round-back.

Catarrh in the mucous membrane of the nose. To treat an acute catarrh of the mucous membrane of the nose with Massage and Gymnastics is of as much or as little use as any other remedy, as the cold, in most cases, disappears without treatment.

A saying made by one of our Medical Professors on acute colds:—"It takes three days to come; 3 days it stands still; then it begins to get well if it will!" is very descriptive, especially as concerns the necessary therapeutics. If the cold has become chronic, treatment in the form of **nose-root-shaking** may in some cases, possibly be useful. It is best however, in every case, first to consult a nose specialist, who more surely, quickly and easily cures this complaint. The seat of the illness, too, is generally deeper than can be reached by the fingers merely or with simple, rod-like instruments.

In order not to leave any ground untried where Medical Gymnastics is used, I have, in a case or two, given nose-root-shaking for chronic cold and with considerable success. The use of the treatment can be explained in this manner, that the shaking helps to loosen the mucus from the mucous membrane. As the one who gives the treatment, according to what I have heard said, often gets a cold himself, nothing much is gained. I have already mentioned before, as something quite natural, that Medical Gymnasts not having any other therapeutic means except Medical Gymnastics at their disposal, are very willing to try it in all possible illnesses. There is, in my opinion, nothing to complain about in this, but rather the contrary. According to the experience of Gymnasts, good results can be obtained by such movements as **shaking, vibration, and friction**, in many cases of catarrh in the mucous membrane of the nose. I have myself very little experience in this direction, but believe however, that specialists should devote more attention than they have hitherto done, to the mechanical treatment of illnesses in the mucous membrane of the respiratory organs.

In cases of *Catarrh of the larynx* the Medical Gymnastic treatment should not be had recourse to before other treat-

ment has proved fruitless, because other treatment can, in most cases, be of more sure and rapid effect than Medical Gymnastics. The larynx is however fairly accessible to mechanical treatment and **larynx-shaking** has often a good effect. It is therefore frequently given, and seemingly with success, in chronic laryngitis.

That larynx-shaking can remove a temporary indisposition of the voice is generally known, and this movement is therefore taken by singers in order to clear their voices. The shaking should, in this case also, loosen the mucus from the mucous membrane and it might also somewhat strengthen the muscles of the larynx, when, from some cause, this has become weakened; for example after lingering fevers.

An electrical treatment is also used in similar cases of illness and it is thus probable that the mechanical treatment should be of use here too, although it is so little attempted that, at present, it is impossible to express an opinion as to the greater or lesser value of the treatment.

Chronic Bronchitis is an affection in which Medical Gymnastics has proved especially beneficial. Gymnastics has, as has already been mentioned, a number of respiratory-movements at its disposal which all make the breathing fuller and deeper, so that the troublesome symptoms of shortness of breath, pain and compression of the chest are diminished, or disappear all together; it possesses also, in chest-clapping, a movement, which is particularly meant to loosen the mucus from the bronchial mucous membrane, at the same time that it greatly furthers expectoration of the same. In cases where chest-clapping is not well tolerated all over the chest (because in more severe cases of bronchitis, it causes too great an irritation of the cough) back-hacking and -clapping are given instead, as they possess a similar, although somewhat weaker, influence. As well as these movements directly influencing the complaint, it is in every case advantageous to lessen the congestion in the lungs by giving so-called "depleting" ex-

tremity-movements; only passive movements at first to weak patients, but larger and more effective active movements can be given at once to strong persons.

As this affection is extremely common and as bronchial catarrh is often only a symptom of some other disease, I consider it unnecessary to give examples of the complaint, but as a number of the patients with chronic bronchitis are very sensitive, and gymnastics is frequently ordered for children suffering from this illness, two Gymnastic Prescriptions are given here, of which No. 1 contains weaker movements, which should be tolerated by any one, and No. 2, stronger movements.

By a combination of movements from both prescriptions an experienced gymnast ought, in every case, to be able to arrange a suitable treatment.

No. 1.

1. **Sitting chest-lifting.**
2. **Half-lying foot-rolling, -flexion and -extension.**
3. **Half-lying chest-lift-shaking.**
4. **Yard-sitting double arm-rolling.**
5. **Arms lean-standing back-hacking.**
6. **Half-lying knee-flexion and -extension.**
7. **Heave-grasp-standing alternate-twisting.**
8. " " " **chest-hacking.**
9. **Sitting chest-lifting.**

After every movement, standing **double arm-heaving outward-upward and outward-downward.**

No. 2.

1. **Heave-sitting chest-expansion.**
2. **Half-lying double arm-rolling and -flexion.**
3. **Standing chest-clapping during double arm-lifting outward-upward.**
4. **High ride-sitting trunk-rolling.**

5. **Leg-lean-standing double plane arm-carrying.**
6. **Hips-firm sitting screw-twisting.**
7. **Stretch-standing knee-flexion and -extension.**
8. See No. 3.
9. See No. 1.

After each movement, standing **double arm-lifting forward-upward, outward-downward.**

Bronchial asthma is characterised by attacks of severe orthopnoea together with expiratory dyspnoea; this affection is included in Gymnastic hand-books amongst those that should be treated with Medical Gymnastics. My experience in the matter is certainly not very extensive, but includes about 20 cases, and to judge from these, there is no right to presume that Medical Gymnastics should be used in every case of asthma, because in not a single one have I seen any marked improvement for any length of time, and cannot even say that Medical Gymnastics has been tolerated well by each patient treated or that it seemed to be of benefit during the time of treatment. During the summer of 1881 I had occasion to treat simultaneously a few patients with bronchial asthma, who, at the same time, suffered from chronic eczema, which latter complaint, as is known, not unfrequently causes or else accompanies asthma. In no case was the treatment of any perceptible use. I must, however, admit, that I did not then understand how to apply the treatment I now give and as it is explained below under emphysema.

The opinion is now held in Sweden, that Pedagogical Gymnastics are not of benefit to young people who are troubled with bronchial asthma, so that this affection, in most cases, is reason enough to free them from school-gymnastics.

A general rule should be, not to let school-children troubled with chronic diseases of the chest take part in school-gymnastics. The reason for this is, that chest-diseases do not so well tolerate gymnastics arranged in this manner, partly because of the, comparatively speaking, low temperature in

school-gymnastic-halls, and partly because these halls cannot be kept free from dust, which is easily raised when many are taking gymnastics at the same time. In expressing myself thus, I do not mean that my opinion is that Pedagogical Gymnastics should not be used for school-children suffering from chest-diseases, because they might require them more than the healthy pupils, but I have wished to point out that the best possible arrangements should be made so that gymnastics do not bring about harm instead of real benefit.

My final judgment as to the use of Medical Gymnastics for asthma is, that less severe symptomatical forms can be advantageously influenced, but not the more severe ones, and that not even the same patient on different occasions can equally well tolerate Medical Gymnastics or benefit by it, a fact which is proved by the following case:

Idiopathic Asthma in a woman, 42 years of age, treated 1894, 1895 and 1896.

The patient had constantly suffered from want of breath and had come to the conclusion that she could not bear dry air, but that she breathed more easily in damp, but she had otherwise not been ill, when, during the autumn of 1893, she commenced to suffer from a very troublesome asthma. The symptoms of this became worse during the course of the winter, so that the nights were especially painful. All kinds of treatment were tried, amongst them a visit to a high-lying watering-place during the spring of 1894, without any essential improvement ensuing. During the summer, however, the symptoms gradually diminished, but a turn for the worse took place again in the autumn of 1894. During this time a Gymnastic treatment was given for two months, principally in accordance with the same principles as are given here below for emphysema. The patient found the Gymnastic treatment very beneficial; the orthopnoea diminished, sleep, appetite, strength and the general state of health improved, so that she could re-commence her work.

When, during the autumn of 1895, she again began to be troubled with asthma, the same Gymnastic treatment was tried for the second time, but she stopped it after three days as it did not seem to do good, but on the contrary, could be borne only with great difficulty.

In February 1896, when her condition, through other treatment, had been considerably improved, she again began with the Gymnastic treatment, could bear it well and found it beneficial.

Lung-emphysema. In emphysema in the substance of the lungs, the lung alveoli are distended and the intra-alveolar

septa reduced, especially in the peripheral parts of the lungs. The consequence of this is, a change in the mechanism of breathing, together with a disorder in the circulation of the blood. On account of the emphysematous process of the disease a great part of the elastic tissue of the lung is destroyed and therefore the elasticity of the lung or power of contraction is also considerably diminished.

When this above-mentioned power asserts itself during expiration, the act of expiration in lung-emphysema will thus be disturbed, the exchange of air in the lungs diminished, in consequence of which orthopnoea arises. The respiration acts as a suction-pump, and, consequently, under normal conditions greatly accelerates circulation of the blood through the lungs. By the diminished elasticity of the lung-tissue the last-mentioned power will be also lessened, and when besides this a condition exists where the capillaries as well as the lung-tissues are reduced, the surface on which the oxidation of the blood must take place will also be diminished, and the vital lung-capacity lessened at the same time. These disorders in respiration and circulation together are the cause of the patient's suffering from "air-hunger," the most characteristic symptom of emphysema.

The Gymnastic respiratory movements are, in this affection, of the very greatest importance, because the breathing is always shallow and the interchange of air incomplete. These above-mentioned defects can be helped by nothing so well as by *Medical Gymnastics*, so that this *must here be looked upon as having quite a specific influence*, although one not as yet sufficiently noticed and acknowledged, which must depend upon the fact that the therapeutic effect of the Gymnastic movements has hitherto not been satisfactorily explained and described in our Gymnastic Literature. Although it is necessary, in the first place, to strengthen the weakened expiration, most of the respiratory movements are useful, in so far as that deeper inspirations must, of necessity, be followed by more complete expirations. The interchange of air in the lungs will thus be greater and the oxidation of the blood in the same

degree more complete. To assist the weakened elastic power of the lungs, movements that directly influence expiration and make it more complete, can also be given. Such movements are: chest-lift-shaking, chest-side-shaking and side-tremble-pressing. Trunk-flexions and -rollings can be so given as to have a similar effect. By screw-twisting and side-ringing the lower parts of the lungs can be more completely filled and emptied. Swedish Medical Gymnastics has thus a great number of movements which directly assist expiration, and I have, during the course of years, by different methods of procedure, come to the positive opinion that in the treatment of lung-emphysema by using expiratory movements with simultaneous pressure on the lower part of the chest, a quicker and better result is obtained as regards the removal of the troublesome symptoms, even if the complaint itself cannot be cured. As is known, *Oertel* has, for his heart-massage, used one of these movements, namely the "side tremble-pressing." I refer those interested to *Olof Wide's* Article¹ and quote only the following from it.

"Although it cannot be denied that *Oertel* is right in saying that the interchange of air is furthered by deep expirations combined with outer pressure, he must not however think that he has discovered anything new, as *this manual compression of the thorax has been used by the old Swedish gymnasts under the name of "grasp-standing side tremble-pressure."* The essential difference is this, that while *Oertel* uses this outer pressure in every case, the Swedish Medical Gymnasts make use of it only where it is indicated, namely in lung-emphysema, accompanied with expiratory dyspnoea. It may also be mentioned, that *Gerhardt* has used and recommended compression of the thorax during expiration in the treatment of emphysema."

It is also worthy of notice that *Gerhardt* has seen good results in *Bronchiectasis* from compression of the thorax during expiration.

When emphysema is accompanied with bronchitis, chest-

¹ Om hjertmassage af N. J. Oertel, Tidskrift i Gymnastik 1889.

clapping should be given to facilitate the expectoration of mucus. If symptoms of venous stasis exist, which is often the case in emphysema, the treatment is arranged accordingly, as is given for heart disease.

Lung-emphysema in a man, 64 years of age, treated 1893. The case treated and described by Gymnastic Director *Evelina Jonassohn*¹, the Gymnastic prescription written by Doctor *A. Wide*.

1. **Yard-sitting double arm-rolling.**
2. **Effleurage on the lower legs.**
3. **Foot-rolling, -flexion and -extension.**
4. **Ride-sitting side-ringing (later, trunk-rolling).**
5. **Heave-grasp-standing chest-clapping with side tremble-shaking.**
6. **Half-lying leg-rolling.**
7. **Half-lying abdominal-kneading, stomach pit-shaking, stomach side-shaking and colon-stroking.**

After every movement, sitting **chest-expansion with side tremble-shaking** during expiration.

This treatment should, according to the above-mentioned reasoning on asthma and emphysema, be used for both these forms of disease and such has, in many instances, been the case. By it, not only can the symptoms of orthopnoea or "air-hunger," bronchial catarrh, cyanosis, oedema etc., be stopped, but real and lasting improvement can be gained, so that every one troubled with emphysema ought to be advised a Gymnastic treatment—but this should last a long time and needs to be repeated if the troublesome symptoms return.

To include *pulmonary hæmorrhage* and *pulmonary phthisis* amongst those affections that should be treated with Medical Gymnastics, as has previously been done in Hand-books, is quite incorrect, especially if, at the same time, a movement-prescription, supposed to directly influence the lungs, be given.

¹ Tidskrift i Gymnastik 1893. Bd. III, s. 818.

It is not likely that any physician would prescribe Medical Gymnastics in order to influence pulmonary hæmorrhage, and gymnasts should thus also be dissuaded from administering the treatment, because it not infrequently happens that hæmorrhage of the lungs is a primary cause of death. In some few cases I have, at the request of physicians, tried Medical Gymnastics in chronic pneumonia, but it has generally proved of little benefit, at least if the illness has been in a more advanced state. The reason of this has probably been, that most movements influencing the chest easily give rise to increased coughing and expectoration, a result which will be advantageous in bronchial catarrh, but not in the above-mentioned forms of disease. One movement that is very well tolerated is **back-stroking**. Experience has shown that this movement can cure night-sweating. I have not had an opportunity to prove this.

The giving of a purely dietetic treatment in the above-mentioned complaints is justified, just as it is in many other illnesses requiring one to remain in bed a long time. Muscle-kneadings and other passive movements on the extremities, and abdominal-kneading are here the most suitable and are also quite sufficient. Chest-clapping, shaking and hacking should, on the other hand, be quite forbidden.

For *croupous pneumonia*, *exudative pleurisy* and *pleuro-pneumonia*, I have, in a few cases, given a *Medical Gymnastic after-treatment* and amongst my patients I have been able to count several physicians, a fact of great importance, as they have all found the treatment beneficial and have expressed their full appreciation of the fact. One doctor had suffered from a very lingering and severe double-sided croupous pneumonia, three had had exudative pleurisy and three pleuro-pneumonia.

The treatment has, in some cases, commenced after the fever had entirely abated; in others while consolidation and discharge remained and fever existed. Medical Gymnastics

gives the best results in such cases of pneumonia where the resolution has taken place slowly or incompletely and in pleurisy, when reabsorption of the effusion is delayed.

Most cases of pleurisy, and probably some cases of croupous pneumonia also, leave behind them adhesions between the pleura pulmonalis and the pleura costalis. As long as these remain, respiration will always be shallow and incomplete, and the patients troubled with shortness of breath and even with pain when breathing. No other remedy can be so sure to arrest these symptoms and restore health as Medical Gymnastics. Moreover, the Medical Gymnastic treatment ought, at the same time, to shorten the period of convalescence in those affections, but as long as the treatment is not adopted at the hospitals, no great experience can be gained in this respect. It is generally considered sufficient to prescribe that the patients suffering from the above-mentioned complaints should get up as early as possible in order better to fill their lungs, or, at the very best, the use of a breathing-apparatus is ordered, but very seldom Medical Gymnastics. I willingly admit, that patients who have gone through the above-named illnesses, are sometimes sent for treatment to our Gymnastic Institutes, after having been discharged from the Infirmary or having been up a short time, but my hope is, that the Gymnastic treatment will be resorted to much earlier and, if possible, while the patients are still confined to bed. Instead of tiring the reader with examples of the affection named I will only say I have every year some cases for Gymnastic treatment of patients who have suffered from pneumonia and pleurisy, and that good results have hitherto been obtained in every case treated, although Gymnastics has only been used in more severe cases, or after other treatment has not given the desired results.

In the introduction I have pointed out the prophylactic significance of Gymnastics as regards diseases of the respiratory organs. I only wish to add here that I have had several cases of suspected *phthisis incipiens* for treatment, in which

have been found symptoms of shallow and inefficient respiration, a dull percussion note over the apices, sunken-in chest etc. and the patients have, almost without exception, found the treatment beneficial. This can be given as prescribed for chronic bronchitis No. 1; hacking and clapping over the apices should, however, be carefully given, as these movements are sure to excite a cough. In more advanced cases, where obvious signs of consolidation or commencement of a liquefaction of the lung tissue exists, Gymnastics should not, as I have already said, be given in any form directly on the chest, but it is always well to try to stimulate the vital activity and improve the general condition of health by giving muscle-kneadings, abdominal-kneading and other such movements.

Although I have considered it necessary to make certain restrictions in the number of diseases of the respiratory organs which have formerly been pointed out as being suitable for Gymnastic treatment, as for example pulmonary hæmorrhage and phthisis, I have, on the other hand, introduced Gymnastics into new spheres, as for example, in after-treatment for acute pneumonia and pleurisy. By giving more distinct indications for the treatment of asthma and emphysema, Gymnastics should be more used than has hitherto been the case in these affections.

DISEASES OF THE DIGESTIVE ORGANS

Of Stomach and Intestinal Diseases, only the more chronic forms have hitherto been treated with Medical Gymnastics. This is also the case, for that matter, with most other affections, but in diseases of the digestive organs it is very seldom that Medical Gymnastics is used until all other remedies have previously been tried with more or less success during a period of many years; and still the purely mechanical treatment, in most cases, offers more and greater advantages than any other. The direct manipulation of the abdomen causes more lively secretion from the mucous surface of the stomach and intestines, it increases the intestinal power of re-absorption and it should moreover help—as in other parts of the organism—to remove an unhealthy formation of mucus from the surface of the mucous membrane; a better and more complete mixture in the digestive-canal of the food-substances and the secreted juices is also gained and finally, a more even and regular purgation is obtained.

For several years I have had a good many patients sent me for Gymnastic- and Massage-treatment, from the leading specialists in Stockholm for affections of the stomach. These patients have frequently, at the same time, undergone a medicinal treatment, water-cure, lavage, have minutely followed dietetic prescriptions, etc. What has here been of the greatest interest is that each patient has been examined by the means, now-a-days so abundant, available for such examinations. I mention this in order to point out to my readers how important it is that a strict examination should be made be-

fore proceeding to treatment, a fact that does not seem to be clear to all gymnasts, in consequence of which many mistakes are committed; I mention this in connexion with affections of the stomach, just because most gymnasts believe they understand *them* at least. The importance of Medical Gymnastics in the treatment of stomach and intestinal affections may be said, in most cases, only to support other treatment rather than to act alone. Dietetic prescriptions are, of course, absolutely necessary, for without these no treatment at all can be of use in affections of the intestinal-canal. Swedish Medical Gymnastics has, for the treatment of stomach and intestinal diseases, a number of movements, which, to a certain extent, can be divided into groups according to their different effects.

Amongst the movements considered as directly influencing *affections of the stomach*, **stomach-shaking** and **stomach pit-shaking** take the first place. It has already been said that the mechanical irritation these movements cause, is followed by a livelier activity in the stomach itself, an increased secretion of the juices, a better mixture of the secreted juices and the food substances. Stomach-shaking is, finally, the cause of the contents of the stomach passing more quickly and completely into the intestines, which circumstance is best observed in stomach dilatation. Subjectively, the patient experiences a feeling of increased appetite after treatment.

Shaking-movements increase the re-absorptive power of the intestines, so that **abdominal-shaking** and **transverse abdominal-shaking** or, in a word, continual shakings over the whole stomach, have a favourable influence in some *catarrhal conditions of the intestines*.

In *atony of the intestines* with accompanying constipation, a powerful **abdominal-kneading** and **colon-stroking** are the most important and most effective movements; a similar effect is produced by all those movements that tax the abdominal muscles. The importance of Abdominal-kneading in furthering the circulation of the blood has been pointed out in connection with the description of diseases of the circulatory organs, as has also the effect of trunk-rollings and leg-rollings,

which are all used in affections of the digestive organs, accompanied by venous stasis.

The importance of *anal-massage* will be further mentioned in connexion with the description of cases.

Chronic catarrh in the mucous membrane of the pharynx can be treated with **pharynx-shaking**, which is specially intended for this complaint. I have seen in a few cases that this movement can improve the condition, if frequently used. *Liedbeck's* vibrator is specially suitable for such treatment. But Medical Gymnastics is seldom given for this affection alone, but usually when it occurs together with other complaints for which Medical Gymnastics is indicated. It is much safer and better to use direct painting of the throat with medicinal matter, and for the gymnast, in every case, to leave that to the physicians. Inner throat-massage with the fingers, ivory-rods, and such like has been much used by gymnasts and of late has been recommended, but the method ought to be further tested before it be claimed to possess any special value.

In *Chronic catarrh of the stomach*, the most general symptoms are weight, tension and pain in the pit of the stomach, tenderness to pressure there, and poor appetite. They are particularly well influenced by **stomach-pit tremble-shaking** and **stomach-shaking**, if these be not given with too hard pressure, which then generally increases the tenderness. A thorough **abdominal-kneading** supports the influence of these movements.

Some Swedish gymnasts say that pressure on the cœliac plexus is of the very greatest importance in the treatment of stomach-affections, and that it is just through that, that stomach-pit tremble-shaking is of any effect, so that it should also always be given in such a way that the finger-tips try to touch this plexus. I can say from experience, that the movement in question is sufficiently effectual and of sufficiently great importance for most affections of the stomach, but without at-

tributing to it the magical importance of influencing "the central-organ of the digestive-canal."

Those gymnasts who most hold to the importance of this nerve-pressing, do not, in the execution of the movement, go so deep with their pressure that the cœl. plex. can be reached. Everyone who knows the anatomical position of the cœl. plex. ought to understand the difficulty, or rather the impossibility of reaching this plexus by outward finger-pressure, at any rate, it is quite an impossibility in the case of stout persons. Moreover, the rôle that this cœl. plex. plays in stomach affections is quite too little known, and still less the importance of pressure on the same, for the least attention to be paid to the statements mentioned.

Besides the direct influence these movements have on the stomach, a general Gymnastic treatment ought to be given, especially to persons who have contracted gastric catarrh by leading a far too sedentary life and indulging in too generous a diet. In this case such movements should preferably be prescribed that tax the muscles of the abdomen, for the long recognized Gymnastic experience that strong abdominal muscles always give rise to normal purgation, has not yet been challenged. A continual exercising and use of the abdominal muscles ought in some degree to possess the same influence on the intestinal muscles as a stomach-kneading and thus also, directly assist in developing the intestinal muscles.

The following Gymnastic prescription can be used for most affections of the stomach which indicate Gymnastic treatment:—

1. **Half-lying (or stretch-lying) double arm-flexion and -extension.**
2. **Half-lying leg-up-drawing and -out-stretching.**
3. **High ride-sitting trunk-rolling + backward-falling.**
4. **Half-lying stomach-pit tremble-shaking.**
 - " **stomach-shaking.**
 - " **abdominal-kneading and**
 - " **transverse abdominal-stroking.**

Dilatation of the stomach is generally caused by some obstruction of the pylorus or else by weakened strength of the muscles of the abdomen, most frequently as a consequence of chronic gastric catarrh. The most important movement in treatment of stomach dilatation is **stomach-shaking** which should be powerfully and continuously given, especially if the object be to overcome a purely mechanical obstruction at the pylorus. The patient, during treatment, should be placed in half-lying position, with the lumbar region a little higher than the other part of the trunk. In stomach dilatation it is perhaps of still greater importance than in gastric catarrh to give active movements for the abdominal muscles, because they are most frequently weakened and attenuated and thus require strengthening. Stomach dilatation is rather a common affection and I have yearly several cases to treat, and a lasting improvement has been the result. As far as I have been able to judge correctly, the stomach has returned to its normal size.

Even in several cases of *neurosis of the stomach*, Medical Gymnastics seems to exercise a beneficial effect and it is fully indicated when digestion is rendered difficult and a continual feeling of fullness, aching or burning is felt in the region of the stomach.

Eructation and *vomiting* are often symptoms of other affections of the stomach but often occur without any previous or simultaneous trouble in the mucous membrane of the stomach.

Cardialgia is, as has already been said, a symptom of chronic gastric catarrh and also of most other affections of the stomach; also frequently of chlorosis and similar weak conditions of the constitution. Under this symptom gastric ulcer is often concealed, so that a Gymnastic treatment should scarcely come into question until a careful examination has been made by a physician well-acquainted with affections of the stomach.

Lack or excess of hydrochloric acid in the stomach is now

a-days, thanks to the chemical methods of examination, rather a common diagnosis. As far as I know, no one has hitherto found out, by direct experiment, how secretion of hydrochloric acid in the stomach is influenced by a mechanical treatment, a matter that should not be difficult to determine. As lavage of the stomach and internal remedies certainly form the best treatment in this case, Gymnastics ought scarcely to come into question, otherwise than to support the effect of these remedies; if dilatation or atony exist at the same time, Gymnastics would be useful.

Most people, suffering from neurosis in the stomach, know themselves to a great extent what treatment they require. They always find a steady, deep pressure on the pit of the stomach beneficial and they often give themselves such a pressure to alleviate the pain. In most cases those movements having such an effect, are useful not only because they alleviate the symptoms temporarily but also as producing a lasting improvement, if used for a longer period; such movements are: **stomach-pit tremble-shaking** and **tremble-pressing**, **stomach-shaking** and **abdominal-transverse-stroking**. These movements should, in neurosis, be given much stronger than for chronic gastric catarrh, and they should also be supported by a general Gymnastic treatment.

It may be sometimes warrantable to use stomach-movements for a purely symptomatical purpose; as for example, light abdominal-shakings and colon-stroking have, in one or two cases, alleviated the troublesome tympanites and pain in cancer in the digestive canal better than any other means.

Intestinal catarrh, both acute and chronic, is treated by Swedish gymnasts with abdominal-movements.

In *acute intestinal catarrh* this treatment should be advised against by everyone who knows that rest for the whole consti-

tution and intestines, produced by suitable means, is effective within a few hours.

Chronic intestinal catarrh can either appear as diarrhœa or constipation or both, and then generally so that the patients suffer from constipation for 2—3 days, after which diarrhœa comes on for one day etc. For such patients abdominal massage is specially beneficial and I have yearly many patients for treatment.

In *chronic diarrhœa* some abdominal-movements appear to be useful, and a reasonable explanation can be found for this in the circumstance that light but continuous shakings and strokings increase the re-absorptive power of the intestines, by which excess of fluid is taken up and the contents of the intestines will thus become firmer. "Depleting" extremity-movements can also have the same effect. Trunk-movements should be avoided. Colic-pains, which are generally very troublesome in all intestinal catarrhs, are sure to disappear after these movements, not only in older people, but also in children. They are of effect for infants, also, even during the first months of life and are therefore to be recommended instead of medicine, especially as every nurse can easily learn to give these simple movements.

Intestinal catarrh in a man, 38 years of age, treated in 1891.

His profession is that of a physician. He is strongly built and of normal condition. This case is given because it is of more than usual interest, partly because the excrements were very carefully examined, partly, and principally, because it shows that a different effect is produced on the intestines by different movements. The purgations were sometimes thin but seldom copious, sometimes more solid; generally 3—4 daily, during the time the catarrhal symptoms were more highly developed. When the purgations were solid, they showed the peculiar and somewhat rare circumstance that here and there they were shiny-white, but their appearance did not generally indicate bile retention. This condition had, with shorter or longer intervals, lasted many years, but increased during the last two years. At the same time symptoms of weight and tension in the epigastrium were felt, formation of gas and at times

colic pains, but not more severe than that the patient could always continue his work. Whether the cause of the affection was to be sought for in the secreting or re-absorbent element of the intestines could not be determined. An inconsiderable, but continual emaciation (10 kilo. in 2 years) was going on, although the appetite was as good all the time as it had been before.

The treatment commenced at the beginning of 1891, and consisted exclusively of **small tremblings and strokings** in the epigastrium and over the gall-bladder during a *séance* of about 10—15 minutes daily, for nearly 3 months' time. The above-named movements were said, by the patient, to be agreeable and beneficial, which was not the case on the contrary, with abdominal-kneading and colon-stroking, which partly felt disagreeable, partly caused diarrhoea. Attempts were frequently made with the last-mentioned movements, but always with the same result. Both the subjective and objective symptoms diminished in intensity during the process of the treatment, although they did not disappear. One proof, however, of a real improvement was found in the fact that increase in weight commenced at the same time as the treatment and was continuous.

The causes of *constipation* can be many; amongst the most general may be mentioned a weakened circulation and, in consequence of this, weakened peristaltic action in diseases of the visceral organs of the chest and abdomen; disturbed innervation in diseases of the central nerve-system; weakly developed abdominal muscles; further, general atony in the intestinal muscles in cases of great age, but also in younger people without any visible cause of derangement; finally, pure mechanical hindrance in the intestines, or outside the same in the abdominal cavity.

As Gymnastics and Massage are scarcely recognized as being of so much importance in any other affection as they are in constipation, I shall give a few cases below, in order at the same time, by giving examples, to show different causes of the complaint. Whatever the cause may be, it can be positively declared that Medical Gymnastics and Massage are here a sovereign remedy, for constipation may date as far back and be as severe as possible, it can still be cured by an energetic treatment, and I am here justified in speaking of a direct and certain effect, independent of all other treatment, which was not the case in the stomach-affections proper, for in habitual con-

stipation, in most cases, medicinal treatment of all kinds, water-cures, enemata etc. have been tried and proved, in the long run, to be ineffectual, before the mechanical treatment has had a chance to show its value.

In most cases Medical Gymnastics is sufficient alone, but in more severe cases of constipation thorough abdominal massage is required to help. To first try Medical Gymnastics alone is what the patients generally wish "because it is less troublesome and cheaper." If, within a month, the desired result be not attained with Medical Gymnastics, massage should also be used, because it should never be without result, if, from the beginning, sufficient strength is allowed to be used and the patients decide not to interrupt the treatment, if it do not prove effectual within the 1st or 2nd weeks. Medical Gymnastics ought however to be given in every case when possible, because through its restoring influence on the whole constitution the improvement will be more lasting. It is almost impossible to give a proper abdominal-kneading to very stout persons suffering from constipation, as the intestines, on account of the thick abdominal parietes, cannot be influenced. Abdominal-kneading does not do much either in such cases, but the Gymnastic movements may be effectual, if used perseveringly. As concerns the method of giving the treatment, it is principally important to powerfully knead the whole abdomen and particularly the larger intestine in all its extent, as this is of the greatest use. The most effectual Medical Gymnastic movements are given in the prescription below, but they ought, when improvement commences, to be exchanged for other generally effective movements, so that at last exclusively active movements are taken, and these should be gone through every day for only in this manner can what has been gained by the passive treatment be kept up.

It is important here too, that the treatment should not stop as soon as improvement begins, but it should be continued even a few weeks after, if constant good health is to be gained.

Every patient treated, should be advised to rub his abdomen himself, for a relapse can easily occur but can also be

easily avoided if the patient will sacrifice 10—15 minutes daily on an abdominal-kneading.

Gymnastic prescription for *constipation* :—

1. Half-lying leg-rolling with knee-up drawing and down-pressing.
2. Ride-sitting plane-twisting (or arch-twisting).
3. Half-lying abdominal-kneading + colon-stroking.
4. Arm-lean-standing raising with abdominal- and lumbar-pressing.
5. Arm-lean-standing sacral-beating.
6. Ride-sitting trunk-rolling + backward-falling.
7. High arm-lean-standing leg-backward-drawing.
8. Hips-firm sit-lying raising (knee-support).

Atony in the intestines with constipation, in a man, 73 years of age, treated 1887.

In this man, who, for many years, had suffered from constipation, the fæces were like small balls, resembling hazel-nuts in form, size and hardness. Laxatives had no effect and the fæces were extremely difficult to get out with enemata, probably because they lay deep within the sacculi of the atonic intestine, but kneading and stroking along the colon easily brought them out. He was treated in 1887 once daily,—altogether 46 times, during a séance of from 25—30 minutes—with **general abdominal-massage, sacral-beating and knee-up-drawing and down-pressing**. Continued treatment caused the fæces to be connected and to be passed without any difficulty, after the nervous innervation had, undoubtedly, been improved and the intestinal muscles strengthened by the abdominal-massage. A female relation afterwards continued the treatment, having first been shown the method.—The improvement gained continued till his death, which occurred two years later.

Constipation, caused by *obstruction in the sigmoid flexure*, in a workman, 43 years old, treated 1890.

In the summer of 1886 the patient began to suffer from constipation, that gradually became worse. After the first three years after the commencement of the illness he had purgations without laxatives or enemata, but the defæcations were painful and accompanied by slight bleeding. In November, 1889, dilatation forcée was made, after which the patient felt

better until February 1890, when no spontaneous purgation could be had. He then began to deny himself food for fear of not being able to get rid of the contents of the intestines. From the beginning of 1890 he had incessant pains to the left of, and under the navel, where the patient also constantly felt a tumor. His inclination for food was good all the time.

Laparotomy was performed on March 11th, 1890, as a tumor was constantly felt in the sigmoid flexure, which continually kept its place even after repeated laxations and enemata.

On opening the abdomen it was found that the tumor consisted of an atonic coil of intestine filled with feces. As the functional power of the intestines had not in the slightest been altered by the operation, Massage and Gymnastic-treatment were commenced on the 27th of March, when the abdominal wound was fully healed, but the massage-treatment had to be more carefully given than if laparotomy had not been performed.

On the 6th of April, thus after only 10 days' treatment, the patient had spontaneous evacuation. The treatment had been given twice daily, or altogether 20 times. Pain and gas-formation diminished gradually and the patient was discharged cured and with normal purgations, after three weeks' treatment. I had news from him during the first few years after the treatment that he still continued in good health.

Perityphlitic exudation, which remains long after the acute inflammatory irritation has ceased, is successfully treated by Massage and Medical Gymnastics. I have now every year such cases, but perhaps I ought here to add—*only for after-treatment*. Some Swedish gymnasts hold the opinion that Massage ought to be used even during the inflammatory stage and, indeed, from the first appearance of the illness, because they believe they have found out that in this manner a relapse at least is quickest arrested. As such an opinion is in direct opposition to scientific Medical Therapeutics, I have wished to point it out as a warning example as to how far enthusiasm and exaggeration can go, and I therefore think I have every right to at least dissuade gymnasts who have not received a medical training from venturing on treating perityphlitis; even an after-treatment should not be attempted without a physician having first prescribed the same.

In the year 1887 I felt justified in stating that "disposition for a relapse will become less in perityphlitis, if Massage and Gymnastics be used as after-treatment."

As far as I know, none of the patients then referred to have had a relapse since that time, and this strengthens the supposition then advanced that, having undergone a Massage and Gymnastic cure, not only ought the existing symptoms to be arrested, but even the disposition to a relapse diminished. The further experience I have acquired since that time has generally happily tended in the same direction.

The Gymnastic movements, which, together with abdominal Massage, have been given for the affection in question, have been:—

1. **Sit-lying raising** (knee-support).
2. **Half-lying double leg-abduction and -adduction.**
3. **Hips-firm sitting alternate-twisting.**
4. **Half-lying leg-rolling.**
5. **Ride-sitting trunk-rolling.**

A collocation of cases treated has been published by Doctor *Astley Levin*.¹

Not infrequently, *constipation* is caused by paresis in the *intestinal muscles*, especially in the rectum, in cases of central nervous diseases; sometimes by *atony of the rectum*, oftenest in old people, but otherwise in quite healthy persons. **Anal-massage** is described on page 63. Its importance in atony of the rectum is very great, still the value of the method of treatment is, at the same time, almost quite unknown.

Anal-massage can advantageously be used even in cases of *prolapse of the rectum*. In treating the same, in most cases, **exterior anal-massage** is sufficient. The prolapsed part of the intestine is replaced before the treatment commences.

In *atony of the rectum*, **interior anal-massage** should be the more effective treatment.

In both the complaints mentioned, *Liedbeck's vibrator* is advantageously used for anal-massage, with, for external mas-

¹ Om massage vid blindtarmsinflammation. Tidskrift i gymnastik. Stockholm 1892.

sage, a large ball-formed contact of about 3 ctm. in diameter; for internal massage a rod-like contact of 6—10 ctm. in length and 0.8—1.2 ctm. in diameter. If no shaking-machine be at one's disposal, it is best to give the treatment manually, but with rods of the above given thickness.

The treatment of *prolapse of the rectum* gave BRANDT the idea of also treating a prolapsed uterus, and from this simple beginning the now well-known Brandt-method of the treatment of uterine complaints has been developed. In cases of prolapsed rectum BRANDT uses the following method of procedure: in the left iliac fossa, a pulling upwards is exercised on the larger intestine with simultaneous pressure from without on the prolapsed part. It is known how a prolapsed rectum can, by only using pressure on the same, be easily replaced, and in children this method would be the least dangerous and, at the same time, the surest. When the intestine has thus been replaced it can, through anal-massage, recover its normal tonus, and lasting good health will ensue. Here, too, the above mentioned movements support the treatment. As this complaint is rather common, anal-massage should be advised, as it is easily given by the patient himself and is quite harmless.

Prolapse of the rectum in a man, 78 years of age, treated 1895.

His purgations had, for many years, been slow and hard, when finally prolapse of the rectum took place on defæcation. At first the intestine could always be replaced after defæcation and then kept its place, but gradually the prolapsus became permanent. Such was the condition, when treatment with **abdominal-kneading** and **interior anal-massage** was commenced in May, 1895. This treatment, given for three weeks, brought about complete improvement, so that the evacuations were normal and the rectum kept in during defæcation. The improvement gained lasted half a year.

The treatment has had to be repeated several times, but always with good results.

That the improvement, after the patient's having suffered from such a complaint for many years, cannot, in so old a

person be permanent is, of course, quite natural. But even if constant treatment should be necessary and lasting improvement be thus gained, much is gained even by this in my opinion

As is known, *hæmorrhoids* formerly attracted much attention in Medical Therapeutics. Now-a-days little or no attention is attached to them, although they are rather a common and troublesome symptom in many affections of the visceral organs accompanied with somewhat difficult circulation and general stasis, and further in constipation, variously caused, etc. *Hæmorrhoids* are characterized by dilatated veins on the anal-opening and the adjacent part of the rectum, sometimes forming hard swellings, which are tender on defæcation and are often pushed out by hard excrements. *Hæmorrhoidal* bleeding, and the treatment of the same, are spoken of in connection with diseases of the circulatory organs, page 188.

That existing *hæmorrhoidal* lumps ought to be put into the intestine before treatment is commenced, need scarcely be mentioned. The effect of anal-massage on *hæmorrhoids* can be explained in this manner, that the varicose veins, which remain filled on account of accumulation of scybala in the intestine, and are prevented in a purely mechanical way from emptying themselves, are, by the treatment, gradually emptied and return to their normal size, at the same time that fresh blood flows through them and exercises a restoratory excitation.

Although anal-massage can be said to have quite a direct effect on *hæmorrhoids*, this effect ought, however, to be supported by abdominal-kneadings, so that the existing constipation is removed; further by depleting leg-movements to diminish the venous stasis in the pelvis generally as well as in the dilatated *hæmorrhoidal* veins.

Thus, amongst the passive movements, leg-rolling here is of great use, and so are active leg-movements as far as such can be borne. The importance of anal-massage for *hæmorrhoids* has really never been recognized, this method having, on the contrary, been rather scoffed at, although it is certain

that no better treatment has hitherto been found. The operative treatment is painful and troublesome, can only be made on some hæmorrhoidal veins and ought not either, under all circumstances—for example, in cases of advanced age, to be advised; at any rate, the very easily given and quite harmless anal-massage should first be tried.

Anal-massage has, in several cases, proved beneficial even in cases of pruritus ani, which sometimes does not seem as if it would yield to any treatment, and which can be so intense that it disturbs the well-being during the day and the sleep at night, through which the pleasure of life and capacity for work suffer, to a considerable extent.

DISEASES OF THE LIVER

For *diseases of the liver*, Medical Gymnastics has less frequently been attempted excepting for venous stasis, which disease can partly depend on a slower circulation through the liver in diseases of the heart and lungs, partly on an abnormally increased flow of blood to the liver caused by too high living, together with too little exercise. That a great number of the so-called circulatory-furthering movements of Swedish Gymnastics ought to be of good effect for congestion in the liver, should be clear from the explanation given of the effect of these movements in the description of diseases in the circulatory organs. **Respiratory-movements, trunk-movements, abdominal-kneadings and abdominal-shakings** are the most beneficial. When, under the above-mentioned circumstances, the liver has shown signs of enlargement to palpation and percussion, I have given stomach-pit-shaking and abdominal side-shaking, applied specially to the region of the liver. Some subjective symptoms have, in this way, disappeared, such as the feeling of weight and tension in the pit of the stomach and region of the liver, while an essential improvement of other symptoms has objectively been observed.

As something peculiar to Sweden I will mention, that people in general here very seldom speak of diseases of the liver, perhaps for this reason, that Swedish physicians do not diagnose diseases of the liver otherwise than in their more severe forms, although quite conscious of the diseased state of the liver together with that of the other organs. So it does not infrequently happen that patients, who are here diagnosed fatty infiltration of the heart or gastric catarrh, are, on going to Carlsbad, Marienbad, Vichy and other places, informed that they have a disease of the liver. Such patients have made it an absolute necessity that Medical Gymnastics shall have a few movements which are intended to directly influence their liver disease. I think the above-mentioned shaking-movements ought to play such a rôle, but attribute however the greatest importance to the treatment of the constitution in its entirety. One of my cases, where essential improvement was gained, can be briefly stated here.

Congestion of the liver, heart disease, and jaundice in a man, 56 years of age, treated 1895.

He had long been conscious of the existence of his heart-disease, was continually out of breath and often felt pain in the region of the heart. The heart was enlarged, the action was weak and irregular. His physician had diagnosed myocarditis.

The patient had led an active life, but had lived rather high. He was troubled with slow purgations and had besides for some time suffered from a feeling of weight and tension in the epigastrium, especially after meals. When Gymnastic treatment commenced, 1/3 95, he was very sensitive to pressure over the epigastrium, and himself ascribed all unpleasant sensations to the region of the liver. The lower limits of liver dulness was enlarged. The colour of the skin had a tendency to yellow, the conjunctivæ were plainly of a yellowish colour.

The treatment was principally given as described for heart disease, only with the addition of the above-mentioned shaking-movements. The patient found these movements very beneficial, an improvement soon commenced, but he continued the treatment uninterruptedly for three months, when all the above-named, troublesome subjective symptoms had disappeared, besides which an essential improvement objectively also could be observed. Jaundice had entirely disappeared, the liver dulness was diminished, and the action of the heart was more regular and stronger. During the past year the patient's condition has always been good.

DISEASES OF THE GENITO-URINARY ORGANS

DISEASES OF THE KIDNEYS

In diseases of the kidneys, Medical Gymnastics should *not* come into question, if, as the Swedish gymnasts have formerly intended, the object be thereby to directly influence the kidneys. On the other hand, Medical Gymnastics can be indicated in albuminuria accompanying heart disease, where the object is to symptomatically facilitate the action of the heart, but, in this case, at least, all movements with the trunk, and such that are brought directly over the region of the kidneys, should be avoided, and only passive movements furthering circulation be given (compare the treatment for diseases of the circulatory organs). Under such circumstances I have, in some cases, seen the albumin essentially diminished or even, for some time, totally disappear, simultaneously with an improvement in the symptoms of the heart disease.

General chronic inflammation of the kidneys, and heart disease (insuff. valv. mitralis) in a man, 52 years of age, treated 1892—1898.

The patient had always done hard work, although he had, for many years, known that he had heart disease. The urine had frequently been examined with negative results; albumin was first discovered when he was about 50 years old. A change for the worse had latterly taken place periodically, showing itself in shortness of breath, general indisposition and considerable prostration of strength and sometimes sickness, with al-

most constant headache and, during these periods of a change for the worse, there was always an increased quantity of albumin in the urine. The quantity of urine was diminished; the urine was dark-coloured and had a high specific gravity but acid reaction. Epithelial casts were sometimes found in the sedimentary urine.

After a period of decline in health and confinement to his bed for two months, he commenced a Medical Gymnastic treatment in February 1892, and after only one month the action of the heart was improved, the albumin diminished and the headache had ceased; after three months' treatment the albumin was no longer found in the urine, and the condition was altogether improved, although shortness of breath ensued after any great exertion.

During the following years the same symptoms have returned every autumn. The treatment has been gone through every year in the above-mentioned manner and always with the same good results, so that the patient attributes to the Gymnastic treatment his being able to keep up and lead a comparatively agreeable life, although he cannot be so active in his work as before.

This case was considered to be chronic Bright's disease. I have, under similar circumstances, seen the albumin in the urine disappear after a few weeks' treatment.

Possibly some cases of chronic nephritis, not combined with heart disease, could be advantageously influenced by Medical Gymnastics so arranged that it would facilitate circulation without, at the same time, taxing the strength of the patient, but this has not hitherto been much tried, and as long as no experience exists of cases specially observed and as the treatment too can be of risk, if the different phases be not properly understood, it would, at least, be best for non-medically educated gymnasts to decline treating diseases of the kidneys. I have considered myself justified in giving this opinion as one adverse to that held by some gymnasts, leaving the decision to future investigation.

Movable or floating kidney is characterized, as is known, by the one (generally the right) or else by both kidneys having sunk from their normal position, more or less deeply into the abdominal cavity. A floating kidney is rather easy to detect, if the attention be once properly directed to its occurrence and

it can, now and then, on careful palpation of the abdomen, be discovered without the patient having had any troublesome symptoms with it. If the sinking of the kidney be somewhat considerable, the symptoms will, in the same degree, be more troublesome, coming on as unbearable pain in the region of the kidneys, fits of ague and sometimes vomiting.

The object of all treatment for floating kidney is to restore it to its proper place and, if possible, to fix it there, with bandages specially made for this purpose. I have included floating kidney amongst those complaints that can, and ought to be treated with Medical Gymnastics, as a number of gymnasts, especially *Brandt* and his pupils, declare they have gained positive, good results from such treatment, and as I have myself, in a few cases I have treated, seen at least an alleviation of the symptoms. The movement that has been considered most beneficial, is **under-kidney-tremble-shaking**.

Right-side *movable kidney* in an unmarried woman, 25 years of age, treated 1888.

The right kidney had, after previous nephrorrhaphy in the year 1884, again become loose, this being proved at the surgical policlinic before the beginning of the Gymnastic treatment. Although there was little hope of improvement, I gave the above-mentioned movement, together with other Gymnastic treatment, by which the condition was essentially improved, so that at times the kidney seemed to be fixed, or, at any rate, less mobile than before.

Right-side *movable kidney* in a married woman, 35 years of age. The case treated in 1896, and described by Doctor *Astley Levin*.

The patient suffers from general weakness; she feels pain and tenderness in the right side of the abdomen, which trouble her both when she eats as well as on moving; she feels that "something slips." She has been married for 9 years and had two children, the first in 1888 and the second in June 1895. The above-mentioned symptoms of floating kidney she only felt occasionally before, but since her second confinement the symptoms have increased and gradually become worse.

The right kidney can easily be palpated a little lower down than normally, it is rather easily shifted both up and down. In standing position and after a few movements it feels more sunk. The whole of the lower part of the right side of the abdomen is tender to pressure. She has

back-ache and myositis there. Treatment with tremble-shaking up toward the kidney commenced on 16/1 '96, and as early as 19/2 it is noted that the patient is stronger, that tenderness in the back and abdomen is gone, and that only the kidney itself is tender. It is easy to shift the sunken kidney upward. The patient feels considerably less unpleasantness from it, for example, not at all when she eats; she feels no pain on walking slowly, but if she walk quickly, and in going up steps, she feels that the kidney slips. The pain is, however, much less than before, and she always feels better after massage.

It is obvious that this treatment, which is in reality a massage on the kidney itself, will be able to lessen a temporary venous congestion, and it is in this fact that the beneficial influence on the symptoms in question ought to be sought. Treatment given directly on the kidney, is therefore justifiable under such circumstances.

DISEASES OF THE BLADDER

Some of these have, ever since Swedish Gymnastics were first introduced, been treated with movements specially arranged for this purpose. *P. H. Ling* speaks of Medical Gymnastics as being given for diseases of the kidneys and bladder, and *Hartelius* mentions, in his Handbook, several diseases of the bladder, for which a Medical Gymnastic treatment can come into question. In spite of its having so long been used, it has not been as generally applied as it well deserves. I must, however, admit, that I long entertained doubts as to the justification of this treatment and that I had worked several years with Medical Gymnastics and seen its good results in other diseases, before I commenced with diseases of the bladder in 1886. One reason for the distrust of this treatment is probably, that cases of this affection previously treated were not described; possibly, too, the strange and badly chosen denominations of the movements (see pages 69 and 71) have been one of the reasons why Medical Gymnastics has not properly come to the fore; possibly even the explanation commonly advanced,

that these movements would not immediately influence the bladder itself, but that the effect was obtained through nerve-pressure practised on the inferior hypogastric plexuses, an explanation which is far-fetched and quite unproved. Of course, there is nothing to prevent an excitation of the nerves being produced here by movements, as well as anywhere else in the organism, but the supposition is much more reasonable that the muscles and mucous membrane of the bladder can be also directly influenced just as well as the muscles and mucous membrane of the intestinal canal.

A question of the greatest importance but one not easy to decide is this: if, and to what extent, the bladder is from a purely anatomical point of view, really accessible to massage-treatment. As is already mentioned on pages 69—72, the bladder can be influenced by movements from three parts, viz., through the front wall of the abdomen, from the perineum and from the rectum.

Of the position and change of form of the bladder with different degrees of distension, opinions have of late frequently varied. In the anatomical Hand-books the bladder has long lain hidden behind the symphysis more or less deep down in the true pelvis. The reason why the bladder was put so low was probably this, that its place of location was only observed after the abdomen had been opened. Principally through the examinations now-a-days made of the position of the visceral organs, ideas have changed, and the bladder has gradually come to rise higher in the body.

It is a fact that the bladder is higher in children and youth than in adults because the pelvis is too small to hold it, and its vertical length is then relatively greater than later on. It falls gradually in the same degree as the relative enlargement of the pelvis and its own change of form. But at the same time that the bladder thus sinks more deeply into the true pelvis, the abdominal parietes become more lax and yielding, so that the bladder is as easily accessible to movement-treatment in adults as in youth. A perfectly empty urinary-bladder is filled out by the mucous membrane, folded together, which.

however, on the trigonum vesicæ is almost smooth, whether the bladder be contracted or not, and it can then lie behind the symphysis of the pubis. When moderately filled, the bladder is, with its upper convexity, almost on a level with the entrance to the pelvis. When more filled, it expands in all directions, so that, at last, with its upper middle convexity, it is not inconsiderably above the horizontal-plane of the entrance to the pelvis; its position and change of form, however, depend on adjacent organs.

As regards the change of form of the bladder with different degrees of fullness, the description that *Henke* has given of it has long been the most complete and the best, but in consequence of later observations, opinions on the subject have considerably changed.

Professor *Clason* has communicated to me the following remarks about the bladder:—"The different forms of the bladder are caused less by the different degrees of fullness in which it is, than by its contraction. If the bladder be not contracted, the wall of its lower half forms an upward concave bowl, into which the upper half is bent, or, more correctly speaking, pressed down by the intestines of the abdomen. It keeps this form with its upper wall bent down less and less, as long as it is not quite full or contracted, when, independently of the degree of fullness, it always takes the rounded form generally described. Then, as is known, it is egg-shaped with the greatest diameter forward-backward and the broader end (in erect bodily-position) directed backward and somewhat downward, and the narrower end forward and somewhat upward. Thus the bladder is egg-shaped, so long as urination is going on, anticipating, of course, that the muscles are capable of contraction. When at once both fully emptied and contracted, it is almost as round as a ball.

In giving Massage on the bladder, it should be quite, or, at least, almost emptied, so that if the patient cannot himself—through the muscular strength of his bladder—spontaneously empty it, catheterisation should precede the treatment. This I have done in some cases. But even when this has been done,

the bladder is soon filled again to some slight extent, which is proved by the circumstance that everyone can, almost immediately after urination, still further discharge a slight quantity of urine. *Henke* says also that a perfectly empty bladder is a phenomenon rarely found in corpses. In consequence of the rather hasty flow of urine to the bladder, it must very seldom happen that a perfectly empty bladder is treated, a fact that, according to my belief, does not matter but rather the contrary, as the bladder on this account is more accessible to Massage, so that a greater surface of the bladder can be influenced. However, the bladder ought not, during Massage, to hold more than about 100 cubic cmt. A well-filled bladder should never be massaged, for, in that case, the treatment might cause a too strong pressure and an uneven expansion of certain parts of the bladder, besides which such treatment would cause the patient pain.

It should be unnecessary to point out, that bladder-massage in no way excludes other treatment at the same time, but, on the contrary, such ought to be used and not infrequently has been, for example, catheterisation, washing out of the bladder, water-cure and medicinal treatment. The degree of fullness of the bladder can generally be pretty exactly determined by palpation, but it is of great importance, however, that in retention of urine, test-catheterisation should occasionally be made and the urine be measured and its composition determined, from which the necessity for simultaneous catheterisation is ascertained and at the same time an expression is gained for the results obtained.

That gymnasts ought never to undertake Massage-treatment of the bladder otherwise than after a physician's instructions, should be clear enough from the difficulties there are to be met with in determining an exact diagnosis and perfectly clear indications for the different methods of treatment. The real fact of the matter is, also, that gymnasts have very little occupied themselves with this branch of Gymnastic treatment.

I have frequently observed, that a firm pressure alone over the bladder can facilitate urination. Elderly men can empty

their bladder more completely, if they place themselves so that they can have support from behind in some forward-bend position, for example, by a table, so that the abdominal organs are compressed, and if, during urination, they simultaneously exercise firm pressure over the bladder with the one hand. That this method of procedure is effective, is best proved from the fact that a good many people use it on their own initiative.

That the bladder is accessible to Massage-treatment, a fact that is often doubted, I consider to be quite proved:

- 1) on account of the anatomical position of the bladder;
- 2) by the circumstance, that everyone, on whom a pressure of the bladder is made through the parietes of the abdomen, immediately experiences a desire to make water, a circumstance, which applies to healthy persons as well as to sick ones;
- 3) finally, through the results that have been gained in the cases treated.

The movements which, for diseases of the bladder, are considered to directly influence the organ, are described on pages 69—72. As has already been said, the bladder is accessible to mechanical treatment from three sides, and the different methods of procedure can, to a certain extent, be used for different forms of disease.

Bladder-massage through the parietes of the abdomen is used in all those cases where the aim is to influence the detrusor urinæ muscle, for example in atony and paresis, and for chronic cystitis.

In describing the movements it has been pointed out, that **Massage through the perineum** is, in most cases, unnecessary and it can generally be replaced by the more powerful effect of Massage through the rectum. Under certain circumstances, however, perineal-massage is fully indicated, namely, when patients shall themselves continue with a treatment which has been commenced; they then find Massage through the parietes of the abdomen more difficult to give, and of less effect than perineal-massage. It has been given in this manner by some patients with paresis of the bladder or prostatism.

Massage through the rectum is given for paresis of the

bladder, but principally for enuresis and prostatism. In cases of enuresis the finger or massage-rod is pushed so far in, that the point lies just behind the symphysis of the pubis where the sphincter vesicæ constantly has its position. For prostatism the finger or rod should reach above the prostate. In both cases the shaking or stroking is given from side to side under firm forward-pressure.

In some cases, depleting leg-movements, such as **leg-rolling, leg-twisting, leg-updrawing and -outstretching** and sometimes **sacral-beating** and **trunk-rolling**, have been used together with the above-mentioned movements, in the treatment of disorders of the bladder.

During the first few years that I devoted my attention to bladder-massage, I was in a condition to choose my cases, and I then principally took such with enuresis and paresis for treatment. Since having spoken of the method in the Gymnastic and Medical societies, several cases of bladder affection have been sent to me for treatment, which have been of the greatest interest as a means of testing the method, although the results cannot, of course, be so good as when suitable cases are chosen.

Rather a common disorder of the bladder is found in some obstruction to the normal discharge of the urine, so that this remains partly or altogether in the bladder—the so-called *retention of urine*. This is chiefly an object for a gymnastic treatment under two special circumstances: either when the retention of urine is caused by *cramp in the sphincter vesicæ* or, when the sphincter acts normally, but some abnormal weakness exists in the discharging power of the bladder—a *degeneration or paresis of the detrusor urinæ muscle*. The opposite condition, namely that the urine cannot be retained spontaneously in the bladder but involuntarily runs out in greater or less quantities—the so-called *enuresis or incontinence of urine*, occurs either when *sphincter vesicæ does not functionalize normally*, or in *cramp of the detrusor urinæ muscle*.

It is only reasonable to surmise that a *weakness* in the muscles of the bladder, whether it be in the sphincter vesicæ or in the detrusor vesicæ muscle, can be influenced by a

massage-treatment, and the curative effect should here depend on the stimulating effect massage exercises both on nerves and muscles, through which these latter gradually become fit for their functions. That *cramp* in sphincter vesicæ can also be influenced and gradually relaxed, when the muscle during a massage-treatment is influenced by the pressure that is exercised on the bladder and its contents, ought also to lie within the bounds of reason, because this pressure is extended to sphincter vesicæ and when it is often repeated, the cramp must finally yield. On the other hand, a massage-treatment for cramp in the detrusor vesicæ muscle can do no good, but would probably only increase its severity. No such case has ever, to my knowledge, been treated.

Amongst the affections that Swedish gymnasts have considered suitable for gymnastic treatment, has been *chronic cystitis*, but, according to my opinion, not even an attempt should be made to treat other than certain cases of catarrhal cystitis. For all other kinds of cystitis there are many remedies, that work both more surely and quickly. I have treated a few cases of *retention cystitis* with massage which have depended upon hypertrophy of the prostate, when the mechanical treatment would, I imagine, be indicated, but I do not think it will ever be generally used.

In most cases of bladder neurosis, massage-treatment has proved effectual. The neurosis generally appears as a functional disorder. *Utzmann* distinguishes between *neurosis of motility and sensibility*. To the former belong *cramp* in the detrusor urinæ muscle and the sphincter vesicæ; further, *pare-sis* of the detrusor muscle, when "*incompetence*" of the bladder arises; finally, *paresis* of the sphincter vesicæ, when *incontinence of urine* and *enuresis* occur. To the neurosis of sensibility belong *hyperæsthesia* and *anæsthesia* of the bladder. *Prostatism* has, in many cases, been successfully treated with Massage.

Of those patients I have treated with bladder-massage, some have been cured or made essentially better; some considerably so or not at all.

Still I dare assert, that my experience in this matter is sufficiently great to allow of my saying authoritatively that massage fills a gap in the treatment of diseases of the bladder, for, in most of the cases I have treated, other treatment has previously been tried with more or less success, but without its leaving perfectly good results. It remains, however, to be seen, how much the mechanical treatment of diseases of the bladder will be employed—if it will be confined to those forms of diseases I have mentioned above, or be employed still more, when the method of treatment has been further developed.

Bladder-massage ought possibly to be of purely prophylactic value. Perhaps elderly men would be spared all these troublesome and painful symptoms that accompany continual retention of the urine, if the massage-treatment were begun very early, that is, even before any considerable retention has arisen or, in other words, when the first signs of retention begin to show themselves. Examinations in this direction have not been made, but would be of great interest.

This objection easily presents itself, that it is not the gymnastic treatment what has given results in such complaints as enuresis, hyperæsthesia and prostatism, but that the effect of the treatment has more depended on suggestion. I have not overlooked and cannot quite exclude this possibility; besides every treatment is justified that gives good results and that one is the most justified which most quickly and best does so.

By *enuresis* is generally understood involuntary discharge of normal urine in children with normal urinary organs. *Inability to retain urine* generally occurs as *nocturnal enuresis*, that is, involuntary discharge of urine during the night or, generally, in a sleeping state; sometimes the urine is discharged involuntarily only in a waking state, that is, during the day, *diurnal enuresis*, or else the urine is discharged involuntarily both in a sleeping and waking state, *continual enuresis*. Enuresis is, so to speak, purely physiological in small chil-

dren, but must be looked upon as pathological when it continues after the third year of life.

In most cases enuresis disappears gradually during puberty. *Ultzmann* considers enuresis to depend on defective innervation of the sphincter vesicæ; other writers, that the sphincter in earliest childhood is very slightly developed in proportion to the detrusor vesicæ muscle and that this causes and explains the enuresis, and also the normally occurring, frequent desire for urination in small children, together with the circumstance, that children, during their first years of life, have great difficulty, even with the exertion of all their strength, to retain the urine so short a time as is required in order to make the necessary preparations for its discharge. If sphincter vesicæ, during the growth of a child, be not normally developed, the child will continue to suffer from enuresis.

In some cases good results have been gained merely by treating the bladder through the parietes of the abdomen, in other cases no results have been obtained. From the year 1895 I have—in treating enuresis in children—almost entirely directed my treatment to directly influence sphincter vesicæ, so that this muscle has been strengthened and more powerfully innervated; in this way, I believe, the best results will be gained. That the above-mentioned muscle should be strengthened by a suitable movement-treatment, ought to be presumed, and the results already gained from the same seem to prove that such is the case. Such a treatment is very simple, and only consists in small shakings from side to side during even and firm pressure toward the sphincter vesicæ, which is best accessible through the rectum. As the treatment generally concerns children and adolescents, the finger should preferably be used, for one reason because the fore-finger can reach the sphincter, and for another, because the finger always feels more agreeable to the patient than does any kind of instrument.

In women, the treatment for this complaint has, by *T. Brandt*, been given per vaginam, but he also mentions treatment per rectum. It is best always to choose the latter method

of treatment, as the same results can be gained and irritation of the genital organs thus avoided.

Besides the local treatment, a generally strengthening one ought to be begun and the child's will-power cultivated, so that he learns to completely subordinate urination to the influence of the will.

Nocturnal enuresis and atony of the intestine in a boy, 8 years of age, treated in 1896 by Doctor S. Wallgren.

The patient had measles in the winter of 1894-95. In the spring of 1895 involuntary discharge during the nights of both urine and fæces began. During the autumn of 1895 he received for some time a strengthening treatment, especially of iron, when the symptoms disappeared for a time, but re-commenced in December 1895, so that both urine and fæces were discharged every other, or every third night. The fæces consisted of "hard firm lumps." During the daytime both fæces and urine were normal.

Treatment commenced 22/1 '96 with bladder-massage, in the above-mentioned manner, when the treatment was also intended to strengthen the external sphincter-muscle. After only three treatments the troublesome symptoms of incontinence of fæces and urine disappeared. The treatment was continued, however, for three weeks daily, in order that the results gained should be lasting, and such has been the case.

According to the experience I have hitherto gained, bladder-massage has been far from curing all the cases of enuresis treated; in some, it has proved quite useless, just as all other remedies tried, hypnotism included; in a few cases improvement has lasted as long as the treatment continued, but not longer; in several cases lasting good health has been the result.

Paresis of the bladder is rather a general complaint, especially in elderly men, without any real disease of the bladder existing and without the urine presenting any abnormal consistency. The paresis is caused, as is known, by enlargement of, or outgrowths from the prostate gland, of which more farther on, but paresis can also occur without any such complications being found.

Paresis generally occurs in the last-named instance through the habit of not immediately emptying the bladder when a desire to do so is felt, but is instead kept filled too long, by which means it becomes more and more expanded. The muscle-fibres of the bladder can in this way lose their power of contraction and become so weak, that they have not the strength to discharge the urine, or that this power becomes diminished in an essential degree. One single omission of this kind can be sufficient to be the cause of very troublesome consequences.

Paresis of the bladder in tabes dorsalis (locomotor ataxy) in a man, 39 years of age, treated in the years 1885—1895.

Paresis of the bladder is rather a common symptom in affections of the central nervous system. As in cramp, so in paralysis, the detrusor urinæ muscle only, or only the sphincter vesicæ, or both together, can be attacked.

The last-mentioned circumstance was the case with this tabetic patient, who was treated from 2—3 months at a time, during a period of 10 years. During the years 1885—1887 he could scarcely ever quite control his urination; it was quite impossible for him to fully empty his bladder, thus showing paresis of the detrusor muscle, but it was, on the other hand, quite as impossible for him to prevent involuntary discharge of urine, so that he was frequently wet, thus showing paresis also of the sphincter vesicæ. The bladder never contained any large quantity of urine. This was the first case I treated with bladder-massage, and since this, I have not had many other cases that have been so gratifying to treat. During the years 1885—87, when, as I have said, he suffered from *paradoxical incontinence*, he could, already after a couple of days' treatment, subordinate urination to the influence of his will, which shows, that the muscles of the bladder, through the mechanical excitation, in this case regained tone and power of contraction. The improvement gained remained as long as he was treated and also some months after, but the symptoms of paresis gradually returned in the same manner as before, until the year 1888. After that time a few years of still greater improvement succeeded, as regards the symptoms from the bladder and even other tabetic symptoms. The further history of the patient will be detailed in connexion with the description of nervous diseases.

Every year some cases of paresis of the bladder are treated on account of tabes, and in a great many cases improvement,

although not a lasting one, has been the result. I have not had occasion to follow any other case for so long a time as the above, and for this reason it has been selected for publication.

Lastly I will point out, that the *mechanical treatment is contra-indicated in a great number of diseases of the bladder*. Amongst them can be mentioned bladder catarrh, depending on infectious diseases of different kinds, tubercle in the bladder, all kinds of morbid growths and foreign bodies in the bladder.

Prostatism. The most general consequence of prostate-swelling, whether acute or chronic, is retention of urine. *The senile enlargement of the prostate* occurs in about 20 % of men, but first, however, at 55—60 years of age; at least, before that time, it does not hinder or increase urination, and not by any means amongst all of this 20 %. As the chronic swelling often begins in the middle of the prostate, the middle-lobe thus formed serves as a closing valve in the urethra, in consequence of which the bladder cannot quite empty itself, but instead, *greater desire to urinate* comes on, but with *little discharge of urine* at each urination, besides which the urine issues in a *weak stream*. *Incontinence of urine* often occurs in the later stages of the complaint and shows, that a distension of the bladder exists; in some patients *polyuria* occurs also. All these symptoms, which accompany retention of urine, are included under the general name of *prostatism*, and the patient, who suffers from the symptom-complex, is called a *prostat*. But here it must be observed, that attention must not be entirely fixed on the changes of the prostate, as the urinary-apparatus can, in its entirety, be morbidly changed, through which the condition of the whole organism will be threatened.

Different attempts have been made to diminish the chronic enlargement of the prostate, such as injections of various solutions, compression, extirpation of the organ, etc. Real and

lasting improvement is said to have been gained in senile enlargement of the prostate by means of castration, introduced by *Ramm*. As this method of treatment cannot, however, be used in every case of prostatism, Massage and Gymnastics should be tried, through which fairly good results can be gained; but these remedies have not, so far as I know, been attempted, until the enlargement of the prostate has been so considerable, that it has caused retention. Perhaps an earlier treatment might prevent the occurrence of the chronic enlargement of the prostate. Attempts hitherto made, have not, however, tended to this, but Massage on the bladder and prostate certainly ought to help the rear- and deepest-lying parts of the bladder to empty themselves better; Massage on the prostate ought, therefore, to be used, even if any diminution of the organ itself cannot be gained.

Prostatism and chronic cystitis in a man, 64 years of age, treated in 1890 and 1894.

He had always enjoyed good health and never experienced difficulty in urination, until, after having celebrated May 1st in the open air, in the year 1887, he felt a great need to urinate, but without success. As reasons for the origin of the illness he assumes, that he was not dressed warmly enough, and that he had consumed a little spirits. The surgeon summoned catheterised him. The urine soon began to flow spontaneously, but on the surgeon's advice the catheterisation was continued a few times during the course of a month.

The condition was afterwards good, until in February 1890, after having again taken cold, he once more had complete retention of urine. He soon commenced to make water spontaneously, but with a very slight flow and after great exertions. The urine contained rather much blood at first, after which the patient was catheterised twice daily, when the residual urine amounted to 200 cubic cm. or more. He had great desire to urination both day and night.

The above-named symptoms were found when Dr. *J. Berg*, Professor in Surgery at the Medical High-school of Stockholm, advised him to undergo a bladder-massage treatment, with which he commenced 17/3 1890. On examination of the urine, no blood was found, but a good deal of pus

and bladder-epithelium. According to the patient's own statement, it had previously, on several occasions, contained gravel. Improvement went on rapidly, so that the patient, after a few massage-treatments, only required to make water once during the night and every second or third hour during the day. The urine became almost free from albumin and was besides clear and of normal consistency, so that the condition, on the whole, was good, when, on 16/4, after altogether 23 treatments, he ceased to come to me. All this time he had had to continue to catheterise himself every evening, although the residual urine, during the last week, never was more than 25—50 cub. ctm., and he had to continue with catheterisation a couple of months after the termination of the massage-treatment.

His condition was afterwards good until January 1894, when, after his again taking cold, the troublesome symptoms of prostatism again recurred. The urine contained a good deal of gravel and considerable albumin. The patient was treated with bladder-massage from 10/1 to 27/2 1894, altogether 27 times, after which he was again quite free from symptoms of prostatism. The urine had, during the progress of the treatment, gradually become of almost normal consistency. The patient afterwards continued for about a year's time to give himself daily bladder-massage in the form of "rubbing and shakings," which were given several hundred times, partly over the lower part of the abdomen, partly from the perineum. He considers himself, that this treatment has been the cause of his condition—as regards urination—during the past years having been so good. The urine is, in December 1898, rather thick and contains a few pus-cells, but it flows in a "proper, strong stream as in youth." The desire to make water comes on every second or third hour during the day and once or, at the outside, twice during the night. Only in the morning, immediately after having got up, the desire to make water will be rather greater, until the bladder has entirely emptied itself—thus a normal condition, considering that the patient now, at the end of 1898, is 73 years old.

DISEASES OF THE MALE GENITAL ORGANS

Spermatorrhæa rather frequently occurs and is probably, in most cases, a consequence of masturbation. Patients, who, from this cause, suffer from anæmia, sleeplessness, a lack of capacity for work, depressed spirits with other diseased symptoms, often desire a gymnastic treatment, and much can be gained by this means, merely by giving generally strengthening movements, such as described under anæmia and chlorosis.

It is also indicated to give leg-movements for spermatorrhœa, which influence the pelvic organs in a depleting manner. In this way many patients have been successfully treated. I consider it, on the other hand, quite unnecessary to seek special movements intended for the genital organ. *Hartelius* prescribes such movements, as pressing above the pubis and perineal-shaking, of which, especially the last-mentioned, can really be dangerous for the disease in question by the irritation that this movement may possibly cause in the genital organs.

Acute prostatitis is seldom treated with Massage, as this complaint is generally infectious, and ends with suppuration, but there are, however, certain forms of a more acute enlargement of the prostate, in which Massage can be beneficial, as is proved by a case, treated by myself, which I will account for here below. In this case I presumed that an acute hyperæmia caused the enlargement of the prostate and, as is known, disorders in the chronic enlargement of the prostate are placed in connection with some hyperæmic state. In all those cases, where it can be presumed that congestion is the cause of the complaint, Massage on the prostate, and also such gymnastic movements as work in a depleting manner from the pelvic organ, should certainly be used, and work beneficially. I have also for this reason included leg-movements in the treatment of prostatitis and prostatism.

Acute prostatitis with retention of urine in a man, 41 years of age, treated 1892.

He was big and powerfully built, very stout, and generally had good health and good capacity for work. At the age of 22 he had had gonorrhœa, but neither stricture nor other consequence of the illness. In the middle of August, 1892, after his having been out a whole day in the rain and wind, so that he had become wet through and thoroughly warm, and had afterwards driven in an open carriage and taken cold, great desire to make water occurred with but small quantities passed. The desire, however, to make water was not more frequent than every other hour during the day and from once to twice during the night. The urine was, all the

time, clear and free from abnormal constituents. After a time a feeling of heat and weight was experienced, with pain about the perineum, so that the patient's physician, on one occasion, resorted to catheterisation, when the bladder contained about half a litre of urine. Enlargement of prostate was proved on examination and was considered to be the cause of the retention of urine. The patient soon learned to catheterise himself.

When the patient was sent to me by Dr. C. A. Claus, on 25/11, 1892, in order to undergo a massage-treatment, the prostate was considerably enlarged, so that it bent inwards to the rectum and seemed to fill out the true pelvis from side to side; the left lobe was somewhat larger; its consistency was everywhere the same and not otherwise than is general for the prostate. Catheterisation took place without any difficulty with No. 7 (English scale).

The treatment was given in this case partly as ordinary **bladder-massage**, partly as **massage à friction** on the back surface of the prostate and moreover in the form of rather powerful **stroking**s in the directions up and out and in and down, toward the middle-line. The treatment continued in this way from 25/11 to 20/12, twice daily. The measured quantity of urine for a whole day varied during this time, between 1,250 and 1,415 cub. ctm. The patient catheterised himself morning and evening, and the quantity of urine thus drawn off amounted, at first, to more than half of the daily quantity, but soon diminished to 100 cub. ctm. and less, so that after two weeks he had to cease catheterisation. The prostate gradually diminished during the course of the treatment, so that, at last, it seemed to be normal. The residual urine was, during the last few days of the treatment, very inconsiderable; the bladder generally emptied itself completely.

One observation that the patient himself made is worthy of mention namely, that when he went away for a couple of days during the course of the treatment, a change for the worse immediately took place in the urination.

On 17/4 1893, the patient informed me, "that he had been well ever since the treatment." He had made test catheterisation 5 times and then obtained no urine at all, or very little—30—40 cub. ctm. at the most. Urination is easier than before and in full stream, without any desire for urination being afterwards felt for several hours.

6/12 1895 "the condition is as good as at the end of the massage-treatment. Immediately after getting up in the morning 2—3 urinations are sometimes necessary before the bladder is emptied." The prostate, on examination, is found to be of normal size.

Dr. C. A. Claus has told me that in his experience, in *sub-acute inflammations of the prostate* after gonorrhœa, he has seen

good results from Massage, given direct on the prostate. In some such cases, after this treatment, fully restored health has been the result.

In *chronic stricture of urethra*, massage-treatment has, during the past few years, been more and more used.

DISEASES OF THE FEMALE GENITAL ORGANS

Some cases, amongst certain forms of female abdominal complaints, are successfully treated, according to the gymnastic method described by *Thure Brandt*. As, during the few last years, this branch of Medical Gymnastics has been explained in detail by *Brandt* himself and a great number of his pupils, I refer anyone who is interested in the matter to the very complete literature that already exists on this subject.

DISEASES OF THE NERVOUS SYSTEM

In an article, published in the year 1887, I remarked that Medical Gymnastics, at the present time, had gained its greatest success and seen the greatest of its newly acquired results within the branch of diseases of the nervous system. My experience gained since that time has tended in the same direction, because if a Medical Gymnastic treatment, in a great number of cases, has been of little or no good, it has then only been one with all other remedies used, but it has, on the other hand, proved beneficial and produced essential improvement in some diseases of the nervous system which have before been declared inaccessible to treatment.

That distrust has existed against a gymnastic treatment for nervous diseases is explained in this way, that non-medically educated gymnasts have not understood how to choose their cases, because they have not been able to clearly give the indications and set a prognosis for the treatment, but have only stated that, if an extremity be paralysed, nothing else but Gymnastics can restore strength of muscle and the power of movement.

Every paralysis in which only certain muscles or groups of muscles are paralysed, has generally arisen through a purely peripheral lesion or through lesion of the multipolar cells in the anterior cornua. In a cerebral paralysis, on the contrary, all the muscles of one extremity, or one part of the limb, are paralysed. A cerebral paralysis is besides, on the whole, characterised by no atrophy occurring, by the reactions being normal and the reflexes being increased; all this the opposite to

what the circumstances are in peripheral paralyses. It should therefore be fairly easy to give a correct prognosis based on the symptoms existing.

If a part of the ganglion-cells are untouched by the process of inflammation, and communication be left in the nerve fibres, gymnastic treatment ought to be given, for there should be hope that a peripheral treatment, under such circumstances, ought, in some degree, to work regeneratively on the central organ, or at least support what is left of vitality in the nerves and muscles.

It cannot be too often pointed out in a Medical Gymnastic Hand-book, that the most important thing in all treatment is just *to make a proper diagnosis*, so that, for this reason, specialists in different branches of medicine ought to be consulted when the diagnosis is uncertain. I have done so in many cases and especially in those of nervous diseases, for knowledge of the same has, within the last ten years, so quickly developed that only specialists in nervous diseases have been able to keep up with it.

If a thorough examination has been made and a proper diagnosis determined, the consequences will be that gymnastic treatment will never be attempted in such cases where it can *a priori* be foreseen that no good results will ensue. The gymnast, who, in this manner, as it were, chooses his cases, will also obtain better results than the one who uncritically proceeds to treatment, without having previously obtained an exact diagnosis of the special case of disease and the prognosis depending thereon.

It not infrequently happens that gymnasts undertake treatment of such cases where no improvement can be gained, but where, however, a treatment that lasts for years is sacrificed without any other result, than that the patient continues to live in the vain hope of a future improvement. On the other hand, cases very easily cured are spoken of as a great triumph for Gymnastics; as for example, peripheral neuritis, which has a very good prognosis and can be quite cured without any treatment at all.

But if gymnasts have thus given Gymnastics in such cases where nothing can be gained by it, they have, however, done no harm to their patient. The physicians have not, on the contrary, always recommended this treatment when it ought to be of use. Even in Sweden, the home of Medical Gymnastics, it was only twenty years ago a kind of article of faith, that if nerves and muscles did not react to electric stimulation, neither could gymnastic movements be of any good. The incorrectness of this idea was proved, earlier than anywhere else, through cases treated at the Gymnastic Orthopedic Institute, for there they were bold enough to take under gymnastics treatment such cases where reaction was not received from electric excitation, and where thus every treatment was considered to be without any therapeutic value.

Ever since a special infirmary for nervous diseases was founded in Stockholm 1887, the Head Physicians there have, to an extensive degree, used Gymnastics and Massage, so that these means, together with baths and electricity, are as frequently to be found in the patients' prescriptions as any medicinal prescriptions. Hereby, at least in Sweden, Gymnastics has gained a legitimate acknowledgment of its utility in nervous diseases.

As nervous diseases vary almost infinitely, any general gymnastic prescription cannot be given for the great number of different forms of disease, as can be the case, for example in heart disease, but everyone, who undertakes to treat nervous diseases, ought to be able to make up a special treatment for each case. In the account of the gymnastic treatment in diseases of the circulatory organs I have pointed out, that this treatment should often be repeated, and that one can retain with but few movements, what has been gained by a more thorough treatment. In most cases of nervous diseases, the treatment may also require to be often repeated, but here another condition must be mentioned, which I specially wish to lay stress on, and that is, that in each case really sufficient work should be put into the treatment. I have, in several cases, seen speedy improvement during the time the treatment

has lasted; the symptoms became stationary when the treatment ceased for a while; and finally, improvement again, as soon as the treatment re-commenced. I should almost, on this account, dare to assert that, in nervous diseases more than in any others, the degree of improvement and the rapidity with which this is gained, exactly correspond with the amount of work put into the treatment. For this reason I consider myself also justified in pointing out that a physician or gymnast with private practise cannot, with complete success, treat all forms of nervous diseases with Gymnastics, because neither his time nor strength can suffice, so that this treatment ought to be left to the larger Gymnastic Institutes or to the University infirmaries, where ample and not too expensive assistance is to be found, and where the treatment, which is frequently rather tiring, can be given first by one and then by another. It is, besides, quite unnecessary, that a physician should give all the treatment needed, but the less delicate and more trying movements can very well be entrusted to practised assistants. If the treatment, in this way, be sensibly and energetically managed, astonishingly good results can be gained, and the gymnastic treatment has also, in this way, in certain cases, completely overthrown the time-honoured notions of the incurableness of certain illnesses and the therapeutic nihilism accompanying these ideas. I dare further assert, that the one who has not, for a longer period of time, followed the course of cases treated, and has not seen, what persevering work is required in and devoted to the treatment of central nervous diseases, has not any right to deny the results which are gained thereby, because he possibly may have seen cases incompletely treated, in which less good or no result at all has been the outcome.

I shall here try to point out a few generally applicable rules for the treatment of nervous diseases by means of Gymnastics. The treatment ought, of course, in the first place, to be directed towards the diseased nerves and muscles, but a

general gymnastic-treatment together with this is, however, of the greatest value in several cases of nervous diseases.

In *paralysis* and *atrophy* of an extremity a thorough, general **muscle-kneading** is first given with accompanying **clapping** and **stroking** of the whole extremity. These movements can very well be given by a practised assistant, and it is often best that the kneadings and clappings be given outside the clothes; one thickness at least of clothes can be left on, so that these movements can then be given stronger, because a good deal of the pain to the skin is lessened or taken away by the material lying between. After the above-mentioned general treatment, the paralysed and atrophic muscles are subjected to a more intense **muscle-massage**, either alone or in groups, according to their accessibility. The paralysed nerves are sought at those places where they lie near the surface, and preferably with a hard underlying part of the body, and are treated with **nerve-pressing**, when such seems indicated. Even the skin over the atrophic muscles gets its share in the form of a powerful **effleurage**.

The skin and subcutaneous tissue are, in several nervous diseases, much involved in the degenerative process; in some cases the subcutaneous tissue is considerably reduced and the skin feels dry and shrunken; in other cases, again, the subcutaneous fat is abnormally thick, so that both the extremities can be the same in dimensions, although the one possesses more muscles, the other more subcutaneous fat. Whether the skin and the subcutaneous tissue be atrophic or hypertrophic, the skin has lost its elasticity; it is pale and feels cold and parchment-like, which proves that trophic disorders exist in one form or another. A strong effleurage furthers the circulation to an essential degree, which is best observed by the increased redness and temperature.

That an improved circulation greatly furthers nutrition in the tissues is, of course, known. Besides these massage-movements, which ought all to be given on the bare skin, all gymnastic-movements that can be used on the extremity in question are given. If the limb be completely paralysed, none

other than passive movements can be given, but even these are of importance, because they certainly counteract the progress of a too great and extensive atrophic inactivity; for even if only passive **rollings, flexions, extensions, twistings** etc. can be given, muscles, vessels, nerves and other tissues will, by their means, be stretched, shortened and placed in the different bodily positions which they would take in a normal state of health, which should counteract the degenerative process in the peripheral parts from progressing too far during the time one must wait for the seat of the part attacked, to be regenerated. As I have already remarked, there is perhaps a right to presume that the mechanical excitation, exercised on the peripheral nerves, can have a stimulating effect on the seat of the diseased part, for in no other way can the good effect of Medical Gymnastics in such cases be explained.

Besides the gymnastic-movements being able to counteract in some degree the progress and spread of the paralysis, they possess another no less important influence, inasmuch as they prevent the origin of deformity, which generally follows paralyzes. Suitable movements can even arrest such deformity, after this has considerably developed. That the gymnastic-movements in this respect have a far greater and more powerful influence than the electrical- and massage-treatments, is quite clear. Orthopedic apparatus too, here support the gymnastic-movements in a forcible manner, of which more will be said further on.

In the treatment of *contractures*, which may have arisen, the so-called *excentric movements* (see page 11) have been considered to be of special importance, and they can here be of more use than the concentric; so for example, in a paralysis of the extensors of the forearm, their antagonists, the flexor muscles, contract and the deformity of the hand and fingers will be more considerable the longer the contracture is allowed to continue, so that at last the hand will be quite useless, although the flexors will still be capable of contraction. If, in such a case, excentric movements with these flexors be diligently used, that is, if the fingers and hand be straightened,

the contracture will not be so developed that the hand will be so completely useless as not to be able to retain a hold of objects, but can, when at work, give essential help to the healthy hand. If the power of contraction still exist, even if only in a very slight degree, in the muscles attacked by paralysis, even for these the excentric movements, in many cases, can be more advantageously used than the concentric, as it has been proved that partially paralysed muscles can exercise a somewhat strong resistance to a movement, although they cannot, to any extent, perform it. So for example, if the above-mentioned case of paresis in the extensors of the forearm exist, these extensors can stretch the fingers only to a very inconsiderable degree, but, on the other hand, they can exercise pretty great resistance, if the fingers be further bent together in such a manner that pressure be practised on the dorsal sides of the fingers; that is, the paralysed extensors are compelled to perform an excentric extension movement.

Gymnastic-movements ought thus to be used to their greatest possible extent, and I consider the method previously mentioned to be a great mistake, viz. only to use Massage or Electricity, but not Gymnastics, in those cases where the paralysis has been so considerable, that the patients have not been able to perform movements themselves. I have therefore always used Medical Gymnastics and Massage suitably combined and found, that this method of procedure has led to good results.

Those muscles or groups of muscles, that still possess any degree of activity, even if only very little, ought, by means of suitable movements, to be compelled to work actively, partly by excentric movements, such as have been described above, partly by concentric, and in the latter case best so, that the patient is himself allowed to perform the movement as far as the paralysed muscles will allow, after which the movement is completed and pursued up to its extreme limits as a passive movement. In this way, one can, in most cases, almost daily see how the activity of the limb increases.

In the same degree as that in which the strength of the

paralysed muscle increases, light movements of resistance are commenced. In order not to tire the patient, active and passive movements must, in every case, be used alternately, according to the general rules given on page 156.

If several extremities, or even the muscles of the trunk, be attacked by the paralysis, the treatment progresses on the same principle. First, a general muscle and skin massage is given, as well as a more local treatment of the muscles and nerves most affected, and finally gymnastic movements, such as are most suitable for each case.

Gymnastic movements are of great importance also in such nervous diseases where paralysis does not exist, but where co-ordination is disturbed, for example, in *tabes dorsalis*, *chorea*, *tremor* etc. The double-sided movements have there been considered to be of the greatest benefit, and this is easy to observe; but it deserves to be specially pointed out here—as recently the Swiss physician *Frenkel* considers he has made the discovery that methodical exercises can diminish or arrest the ataxy in *tabes dorsalis*, a very old experience in Sweden.

The treatment here described has principally been directed against disorders in the motor nerve apparatus, but consideration is also, of course, taken in the making-up of the treatment of the sensory nerve apparatus and of other local symptoms. In *anæsthesia*, more weight is laid on **hackings**, **clappings** and general **nerve-pressing**, when all these movements are so performed, that they principally irritate the skin (see page 51). In *hyperæsthesia* and in *neuralgic pains*, for example of a lancinating or constrictive character etc., **nerve-frictions** are given along the nerves followed by constant and extensive **strokings** on the part of the body treated, which movements are, by most patients, well tolerated and by some patients described as more soothing than the medicinal remedies which have a sedative effect. Such nerve-frictions and strokings have a beneficial influence even in those nervous diseases, which are accompanied by *tremors* and *spasms* of different kinds, so that, in the treatment of such affections, they should never be excluded.

In disorders of the apparatus of digestion, suitable stomach- and abdominal-movements are given and in disorders of the functions of the bladder, bladder-massage is given on the principles which have been followed in the description of these complaints. It is also well, as has already been said, in many cases, to give a general gymnastic treatment, independently of the local symptoms, so that even the healthy parts of the body get their share. This method of procedure is especially beneficial to patients confined to bed, who completely lack the exercise so necessary to the well-being of the body.

Nerve-friction has been mentioned on pages 81—82, but only **head-nerve-friction** has been taken up as a special movement. In the description of this movement, its importance in the treatment of head-neuralgia, so commonly occurring, has been pointed out. Especially in treating that part of the head, covered with hair, the head-nerve-friction far surpasses the ordinary massage-movements.

Frictions can advantageously be given along the nerve-roots of the extremities and also on the chest. They must possess an essentially stimulating effect on the constitution and are easy to perform, but must not be ascribed so great an importance that other movements should be left out in the treatment of nervous diseases, if really good results from it shall be gained. The case is the same with nerve-frictions as with nerve-pressings, that they have hitherto been too infrequently employed in carefully examined cases of illness to allow of any definite opinion on the greater or less importance of the same being pronounced.

Orthopedic apparatus for the treatment of nervous diseases.

Orthopedic apparatus are of essential importance in a great number of cases of paralysis and muscular contractions; in one instance, to make it possible to use that part of body which is paralysed, in another, to prevent the rise of a deform-

ity, or, at least, to prevent the deformity from increasing and the extremity in question becoming useless. It is more seldom that orthopedic apparatus are used for paralysis of the upper extremities. In peripheral paralysis of the trunk-muscles and also in some diseases of the spine, corsets are of use on account of the support they give the trunk and thus to the whole bearing of the body. Orthopedics come most frequently to the fore in cases of paralysis of the lower extremities.

It is clear, that orthopedic apparatus in no case excludes a simultaneous massage and gymnastic treatment, where the latter is indicated. It may rather be said that both together are quite necessary, at any rate in the treatment of paralysis and contractions, if perfectly good results are to be gained. The massage and gymnastic treatment is supposed to sustain what still remains of vitality in the nerves and muscles, or even to restore them to new life; the object of orthopedic apparatus is, at the same time, to render the extremity capable of use or to prevent the development of the deformity.

A question of the very greatest importance, in the treatment of nervous diseases, is; when shall one dare to begin with gymnastic movements, for example, after paralysis has arisen. No general rule can be given. Each special case must be examined most carefully and the treatment prescribed accordingly. If the treatment be put off too long, perhaps the best time will be lost; but, on the other hand, more harm than good may be done if the movement-treatment be commenced too soon. Attention must first be paid to the causes of the complaint, which, in paralysis, can be most varied; further, to the manner of origin of the paralysis and its spread, with other circumstances. In an infantile spinal paralysis, for example, the paralysis generally immediately attains its greatest extent, and may then partly diminish during the first few days after the appearance of the attack. To suspend treatment at this stage for weeks or months, as is generally the case, cannot possibly be indicated, but nature's own struggle to restore

the injured part should be supported as early as possible, that is, as soon as the paralysis has begun to retire, so that atrophy and deformity may not attain to any great extent. Greater care will be required in other cases. For example, in paralysis after external injury, which must be completely healed before the movement-treatment be commenced. In paralysis after hæmorrhage of the brain, great care will also be required, because the paralysis here can, during the first few days, be quite inconsiderable, but, within a short time, a noticeable change for the worse may take place and a treatment, commenced too early, may cause fresh hæmorrhage. By a gymnastic treatment in the above-mentioned cases I mean light muscle-kneadings of the extremities, while the patient continues confined to bed. After these movements have been used for some time, small passive rollings, flexions and extensions can be given the extremities, according to the general rules which have already been mentioned.

PERIPHERAL NERVOUS DISEASES

Amongst *diseases of the motor nerves*, paresis, cramp and neuritis are most amenable to gymnastic treatment; amongst *diseases of the sensory nerves*, principally neuralgia and anæsthesia.

Paresis in the posterior interosseous nerve is perhaps the commonest of peripheral nervous diseases, and most frequently the cause of the affection is some external injury. I have treated many cases of true pressure paralysis in the posterior interosseous nerve with perfectly good results.

Right-sided *posterior interosseous nerve paresis* in a man, 29 years of age, treated 1891.

The paresis appeared 22/10 1890, after fracture of the lower part of the humerus with involvement of the nerve in a callus-formation. The mobility of the forearm and hand was almost entirely lost, and the muscles

somewhat atrophic. The nerve showed degenerative reaction. The patient was a clerk, and it was a case both of restoring his ability to work and at the same time of releasing an Accident Insurance Company from the payment of heavy compensation. The chiselling of the nerve out of the callus had been thought of.

Massage and gymnastic treatment were given twice daily from 21/1 to 18/2 1891, when the patient was already so far restored and able to work, that any compensation for invalidity came into question no longer, and certain hope of the complete cure of the patient was entertained, and this was effected after his having continued the treatment at home.

Besides the rapid improvement, this case was of special interest, on account of reaction to mechanical excitation of the nerve having been obtained, while electric irritation produced none, which circumstance was proved by Dr. *F. Lennmalm*, Professor in Nervous Diseases at the Medical High-school, Stockholm.

The posterior interosseous nerve paralysis does not offer any special interest from a mechanical therapeutic respect, as the prognosis is generally good, and, in most cases, the patients can be restored to health even by means of an electric treatment or even without any treatment at all.

Cramp in motor nerves.

Right-sided *facialis-crampe* in a married woman, 38 years of age, treated 1890, on the advice of Dr. *J. Wærn*, Professor in Pediatrics at the Medical High-school, Stockholm.

The patient's rest at night had for many years been disturbed, on account of having to look after a delicate child, and she had in general had insufficient rest. The consequence of this was, amongst other things, that she suffered from headache and finally from cramp in the muscles of the face and neck, which first appeared as blepharospasm, especially in the right eye, and afterwards as spasmodic jerks in the muscles of the face and platysma on the right side. She had experienced creeping and pricking sensations in the right arm, extending down to the fingers. On the inner side of the forearm the sub-cutaneous tissue was atrophied to an extent of about 10 ctm. in length and 4 ctm. in width, so that, as the patient was rather stout, this point looked like a hollow on the surface of the arm; it was of a bluish colour, as the underlying muscles could be seen through the thin skin. As regards sensitiveness, there was no change on this spot and no paræsthesia, as there were in other parts of the arm.

The patient was treated with constant electricity, Massage and Gymnastics, consisting of head-hacking and head-flexions and -twistings, with slight resistance. The Massage consisted of a light effleurage over the face and downwards over the throat. The treatment was given 34 times from 5/2 to 2/4 1890, during which time cramp in the face and throat entirely disappeared. On the above-mentioned atrophic part of the upper forearm a thorough effleurage was given, and during the progress of the treatment, the sub-cutaneous tissue had gradually returned, so that the atrophic portion finally extended over about a third of its original area, situated in its central part.

It is of interest to note in this case, that a female gymnast had previously given very hard Massage for a time, and the state of the patient had only become worse. In February, 1896, the patient says, that "since the end of the treatment 1890, she had no cramp whatever nor pain in the arm; that she had been considerably less troubled with headache; that the atrophied spot remains, and that she considers the treatment given to have produced especially good results."

Trade neuroses

generally occur during the best working period of a man's life; seldom in children or the aged, with about the same frequency in both sexes. The illness creeps upon one, and its course is slow. One fact, which is recorded in all medical works on trade neuroses, is this, that they principally occur in persons who have an inherited or acquired nervous disposition. In such persons trade neuroses appear more readily than otherwise; so much can at least be safely said. Cold and trauma are also given as etiological factors. Neuritis in any of the nerve roots of the arms or even in the plexus brachialis is sometimes the cause of the affection. In several cases I have observed tenderness over the nerves of the arm; in a still greater number, over the muscles. The myalgia and neuritis are probably, however, not the cause of the complaint, but rather a consequence of the excess of work which has produced it, for as far as I have been able to judge, overwork has, in almost every case, been the cause of their appearance. On account of the symptoms which trade neuroses exhibit,

they are divided into three forms, namely: *spastic*, *tremulous*, and *paralytic*.

The spastic neurosis is generally attended by tonic cramp in the thenar muscles and in the flexors or extensors of the forearm, but may extend up to those of the upper arm, shoulder, or even right up to the muscles of the throat and neck. The cramp can occur as flexion or extension cramp. In writers this occurs in rather a strange manner. In flexion cramp the thumb and fore-finger are strongly and quickly bent in toward the palm, so that the pen cannot be fixed; in extension cramp the fingers spread themselves out, so that the pen consequently falls out of the hand. Cramp frequently appears in the flexor and extensor carpi rad., when the pen, in the middle of writing a word, slips along the paper or goes right through it, on account of the strong and sudden ulnar flexion in the wrist.

When cramp is tremulous, it generally appears as pronation and supination tremors, and in writers, the rather common and typical tremble writing occurs. It frequently occurs also in old persons and always, although not so obviously developed, after every trying and constant work with the hands. Labourers always write an unsteady and trembling hand, and every gymnast or masseur has certainly experienced, that this kind of writing easily occurs if one write immediately after a few hours' work. It is worthy of note, that frequently in the tremulous trade neuroses no other symptom is found except tremor, which always appears on attempting to perform one, certain, given movement, but not otherwise, and that tenderness to pressure, feeling of paralysis and other general symptoms usually accompanying neurosis are quite absent.

The paralytic form of trade neuroses in milder cases shows itself in fatigue, in more severe cases by a feeling of paralysis in the working extremity—at the commencement of the affection only during the exercise of the trade, but if the complaint be allowed to develop itself, finally in all movements with the part of the body attacked. These patients further complain of

a feeling of weight in their extremities. This form seems to be more frequently than the others accompanied by ache and pain in the part of the body attacked, or even in the other corresponding extremity. Besides, mixed forms of this affection often occur, so that it is not easy in every case to refer the illness in question to a certain form.

The prognosis is not particularly good in trade neuroses. The affection may, unfortunately, follow the patient all through life, in spite of every possible treatment. In treating trade neuroses, therefore, too much should not be promised.

The opinion that Massage and Gymnastics are the most effective means, is almost generally accepted. The treatment gives the best results when the muscles attacked by cramp or paralysis, are massaged and given passive movements. No harm can be done if active movements and movements of resistance be also given these muscles. When the co-ordination is disturbed, double-sided movements of resistance are of benefit in this as in other affections with this symptom, but they should be given so that they distress the patient as little as possible. The gymnast's resistance must not be greater than is necessary to guide the movements and to make them even, that is, co-ordinate. Amongst movements suitable for the arms may be mentioned **double arm-flexion** and **-extension**, **double plane arm-carrying**, **double arm-lifting**, **double arm-flinging sideways**.

Should there be muscle inflammation in other muscles besides those attacked by cramp or symptoms of paresis, they should also be treated. The direct nerve treatment is, however, of more importance than muscle-massage and muscle-movements, especially in those cases where palpable changes can be observed; but, even if only neuralgia be present, the treatment should be directed to the nerves, in the hope that it will be effectual in these cases as in neuralgia generally. Nerve massage is, of course, also of value in the paralytic forms. The most important of all is, however, as has already been said, that the patient avoid the particular work which has produced the trade neuroses from which he is suffering.

As trade neuroses in our times are becoming more and more common, so that new neuroses accompany almost every new occupation, and as they are most commonly, or almost exclusively treated by Medical Gymnastics and Massage, I have thought it my duty to quote a few cases of the affection here, in order to give examples of the different causes of the same. All these cases are taken from an article, formerly published "On trade neuroses."¹

Writer's cramp in a man, 42 years of age, treated 1889.

He has been a writer for 20 years and, especially during the last 6 years, has written to an incredible degree. He can alone write as much as 3 other practised clerks. From October 1888 to the end of the year he was occupied in copying at least 18 hours a day, often 20 hours. As early as the end of 1887 he began to feel symptoms of writers' cramp, this showing itself by numbness and paralysis of the arms without cramp or trembling, but it did not altogether break out until after a few days' rest at the end of 1888. When he afterwards returned to his work, it was impossible for him to write more than from $\frac{1}{4}$ — $\frac{1}{2}$ an hour at a time. When he commenced to be treated in January 1889, he constantly felt weakness and fatigue in the whole of the right arm, but chiefly in the shoulder, where an obvious tenderness and infiltration in the muscles could be observed. Tenderness to pressure was, however, most developed in the muscles on the right side of the throat and ulnar side of the forearm, whereas there was no tenderness over the brachial plexus nor the nerves of the arm. As he further suffered from anæmia and very severe insomnia, he received, together with the local massage, a general gymnastic treatment during a period of three months, in which he became better in all respects, but not fully restored to health. For two months during the summer of 1889 he altogether refrained from writing, and took mud-baths, by which he became still better. Since then he has written about 10 hours a day and has managed in that time to write about 40 pages. A change for the worse has, in November, 1889, again taken place, so that he has recommenced treatment. As it is next to impossible to order a clerk to quite give up doing the only work he can do and by which a whole family must be provided for, work must, in such a case, be continued during the period of treatment, although really complete rest should be taken.

¹ Tidskrift i Gymnastik, Bd. III, sid. 4. Stockholm 1889.

Piano-playing-neurosis in a girl, 17 years old, treated 1888.

The patient for two years played 4 hours daily, until numbness and ache in the right arm set in. Tenderness to pressure was felt over the muscles of the neck and shoulder and down the whole arm. She was treated as soon as the trouble was discovered, so that good results were obtained within a month. She rested a few months, was then able to gradually recommence playing, and, by restricting this to, at the most, one hour at a time, could continue with it and so prepare herself to enter the Musical Academy.

Telephone-neurosis in a woman of 24 years, treated 1889.

The patient began work at the office in 1885. After having done service for 1½ year, the left arm began to ache, as this member had almost uninterruptedly been kept bent and lifted in a horizontal position, so that the transmitter could be kept close to the ear. Soon the right arm also began to ache. The pain increased and became more and more constant, so that at last it was present night and day, besides which the arms felt heavy. After having had a month's rest during the winter of 1887—1888, and 2 months during the summer of 1888, her condition became rather better, so that she could work without interruption during the winter of 1888—1889, although she continually felt fatigue in her arms. After the onset of the affection she was treated daily with Massage on both arms, as well during the months of rest as between these periods, and this treatment has certainly been of good, as she has been able to continue with her work, at the same time that the progress of the affection has been checked. After 2 months' thorough Massage and gymnastic treatment in the summer of 1889, together with rest at the same time, further improvement has been made.

Besides the subjective symptoms of fatigue and weight, œdema-like swelling of the arms has been observed at times, and a considerable and very extensive tenderness to pressure over the muscles of the arms, but still more over the larger nerve roots. Some of the muscles felt infiltrated and hard.

Of *gymnast* and *masseur-neuroses* I have seen a few cases, more or less pronounced, and I am certain that most operators, who have, for a few years, daily worked at Massage, have felt symptoms resembling those which have already so often been described, and which will again be mentioned. The Medical gymnast is not so liable to be overworked as the masseur.

because the former has to perform a great variety of different movements, while, on the other hand, the massage-movements are fewer, more limited and determined, and above all exact greater exertion of strength and perseverance, as this treatment is always more local and is often given for a long time at a stretch.

Diseases of the sensory nerves.

For neuralgia, Massage is more often used than gymnastic movements proper, as a distinction between the two methods is made now-a-days. Still, as far back as Swedish Gymnastics can be traced, neuralgia has been most successfully treated by movements such as **hackings**, **nerve-frictions** and **vibrations** and **strokings**. In facial neuralgia the so-called **point-hacking** (see page 44) has played an important rôle.

As, however, neuralgia belongs more to a massage-treatment, I shall only mention here such forms of the affection, in which gymnastic movements are more effective than massage-movements, especially as, so far as mechanical therapeutics is concerned, more is written on this chapter than on any other in the large group of nervous diseases. I will only remind the reader of the soothing effect that strokings and frictions, if only they be given strong enough, can have on the nerve pains which accompany some central nervous diseases.

Cervico-occipital neuralgia in a man, 32 years of age, treated 1880.

This case specially deserves to be mentioned, because it resulted in a perfect restoration to health by means of one single movement, viz., *head-nerve-friction*.

The patient, who is very bald, had contracted neuralgia by lying in an open boat, in windy weather, for a whole night, bare-headed. He felt perfectly well in all respects, excepting that he was troubled with constant headache, which at times was extremely severe. The pain was localised to the top of the head and to the neck. The skin and subcutaneous tissues over these parts felt here and there somewhat swollen and very tender to pressure.

Within a month he was essentially better, but continued the treatment, however, for 2 entire months, and became consequently fully restored to health and fit for work.

In *intercostal neuralgia* I have, on several occasions, seen great benefit result from gymnastic movements when the pain depended upon deformity of the chest with consequent compression of the ribs and pressure on the intercostal nerves. Massage will in this case be of no use, but such movements as **chest-lifting in different planes, side-flexion** toward the convex side, and **hanging**, etc., have been able to alleviate the pain.

Mammary neuralgia in a physician, aged 56 years, treated 1883.

The patient was cured in 3 weeks' time by **chest-lifting and chest-hacking**. He had long thought he was suffering from heart disease, because he frequently felt pain in the region of the heart, radiating to the left side of the chest and inner side of the left arm. Tenderness to pressure was found only under the mammary gland.

Neuralgia in the joints, or so-called *joint-neuroses*, occur pretty frequently, without there being any noticeable anatomical changes discoverable in the joint itself or its vicinity, but the patients complain of intense pain, and it is not unfrequently found that a fully pronounced atrophy in the whole of the extremities accompanies this complaint. I have seen joint neuralgia in hand-, hip- and knee-joints. Gymnastic movements have generally proved of good effect. As diseases of the joints will be described in a special chapter, no case of the affection will be quoted here.

Sciatica occurs, as is known, pretty frequently and, now-a-days, Massage is probably the best remedy for it, as fully good results can, in most cases, be gained thereby within a very short time if only the Massage be given perseveringly.

In some cases gymnastic movements will strongly support the Massage and sometimes even surpass its effects. I consider it necessary, however, to point out here, that I have met with a few cases of sciatica in which these means have been of no avail, probably because the complaint has had a central cause, but in such cases no other treatment has been of any use. I just remember a young man who, on account of having a severe sciatica, was obliged to give up his military career. One case, in which Gymnastics has been of good effect, may here be quoted.

Right sciatica in a man 20 years of age, treated 1890—1891.

Symptoms of sciatica, sometimes more severe, sometimes less, had already existed 3 years and, according to the patient's own statement, had arisen after very trying Gymnastics, not at school, but exercises in "acrobatic-gymnastics." Probably the trouble may have arisen on account of the patient having, as he himself says, waded in water up in the fell-district while out botanising.

On the commencement of the treatment he constantly suffered from cutting pain all along the extent of the great sciatic nerve. Electricity and very hard Massage were given from 11/4 to 31/5 1890, but without producing any marked improvement. As the pains continually increased during the following summer, nerve stretching was done under chloroform in the beginning of August, but without effect, so that operative nerve stretching was performed in the middle of August. After this, the patient was free from pain as long as he was in bed, but as soon as he got up, it again began with renewed severity both in the hip and leg. He now felt "more tenderness in the nerve itself and stiffness in the whole of the leg." The leg had gradually become atrophic, and tenderness to pressure was now found over the lumbar vertebræ also. A gymnastic treatment was advised by Professor *J. Berg*, who had performed the nerve stretching. The patient was treated exclusively with leg-movements, with passive as well as movements of resistance, daily from 4/9 to 24/12 1890 when he had already become essentially better, and fairly regularly every other day from 2/1 to 10/4 1891, when he felt so far restored that further treatment was considered superfluous. He has since then been free from his long and painful affection.

In February 1896 his condition is still good; "sometimes a little pain is felt in the right hip, but nothing to be compared with the violent pains felt before." The right leg is somewhat weak and slightly atrophic.

VASOMOTOR AND TROPHIC NEUROSES

Under this heading are now included some affections that have been considered as belonging to sympathetic nervous system, but of the different varieties of this complaint no certain observations have hitherto been made.

The Swedish gymnasts have rather frequently tried to treat the sympathetic nerve. The cervical ganglions, the epigastric plexus and the inferior hypogastric plexuses form those parts of the sympathetic nerves which have been considered to be accessible to mechanical treatment.

Some neuroses belonging to the above-mentioned group can be treated with Massage and Gymnastics.

Dr. *S. Wallgren* has successfully treated two cases of *symmetrical gangrene*, and I have myself treated a few cases of *myxœdema*.

In connection with *myxœdema* I should also like to briefly draw the reader's attention to the swellings, so commonly occurring, in the subcutaneous tissues, to which the name of *cellulitis* has been given. The hand-books generally used in Massage do not treat of this subject. Cellulitis, as a rule, passes for myositis, but may resemble all possible affections, such as heart disease, abdominal and uterine complaints, hip-joint disease and spondylitis, etc.

The swelling in the subcutaneous tissues may be pretty extensive, often feels hard and firm and has the character of an organised œdema, somewhat tender to pressure; the skin above sometimes feels warmer than the surrounding parts, and the functions will be disturbed in that part of the body over which the cellulitis exists, so that everything indicates an inflammation in the subcutaneous tissues. A Massage and movement-treatment is always justified, for as soon as the swelling has been worked away the patient is generally relieved from the troublesome symptoms that accompany cellulitis.

For *hemicrania* or *mègrim*, Massage is a cure that is often used and in many cases successfully. Amongst other reme-

dies, Gymnastics can also be recommended, especially when a generally strengthening treatment is indicated.

Similar swellings may be met with in the subperitoneal fat of the abdomen and pelvis, especially among fat individuals. As the swelling is very tender to pressure, and the patient experiences pain, which not infrequently partakes of the character of peritonitis, these pains are often mistaken for diseases of the visceral organs.

Only a few cases will be mentioned.

A man aged 36 was supposed to have *heart disease*, but in reality suffered from cellulitis of the lower left side of the thorax. He was completely cured by attending 33 séances of massage-gymnastics.

A woman aged 60 years had for some time undergone medicinal treatment for *gastric catarrh*. Within a month she was freed from all symptoms by massage of the subcutaneous swelling in the epigastrium.

A woman aged 34 was sent to the gynæcological clinic to undergo operative treatment for a *uterine tumor*. An intensely painful swelling in the lower part of the abdominal wall disappeared after 3 weeks' massage, and at the same time she was also freed from the supposed tumor.

A woman of the age of 23 years, in early childhood had had *appendicitis*. Pain and tenderness on pressure on the right side of the abdomen indicated the same affection. Along the whole of the ascending colon a swelling was felt, which entirely disappeared after a few weeks' massage.

A woman aged 28, supposed to be suffering from *coxitis* on account of cellulitis about the hips. She was absolutely cured by massage and gymnastics in six weeks.

A woman aged 26 with *spondylitis*, permanently cured in about six weeks.

As is well known, during recent years preparation of the thyroid gland has been tried and proved to be a specific for myxœdema. Whether this is efficacious in every case remains to be seen.

DISEASES OF THE SPINAL CORD

Some diseases of the spinal cord have been treated by Swedish gymnasts with Medical Gymnastics who, in these cases, thought themselves able to accomplish a good deal. It cannot be denied that several of the symptoms attendant upon these diseases, can be alleviated or checked for a time by a gymnastic treatment, but for that reason there is no right to

presume that the affection itself is cured. As a matter of fact, this seldom or never is the case, but Gymnastics is, however, as a symptomatic treatment, of as great value as other remedies and in certain symptoms perhaps of even greater use. So, for example, paresis of the intestine and bladder is strongly influenced by the movements specially intended for these organs, the pains are alleviated by nerve-friction and stroking, weakness in the muscles is strengthened by muscle-kneading and serviceable movements, and even symptoms of ataxy are diminished by a movement-treatment. That it will be necessary to continue long with the treatment, and that this may require to be frequently repeated, has already been said.

Amongst *diseases of the spinal cord*, principally tabes dorsalis and infantile spinal paralysis have, ever since P. H. LING's time, occupied the Swedish gymnasts, but I have also seen Gymnastics serviceable in some other forms of the disease, such as spinal irritation (*commotio medullæ spinalis*) and progressive muscular atrophy, etc.

Spinal irritation is probably looked upon more as an hysterical symptom than as a distinct affection, but this diagnosis was formerly often made; of later years it has scarcely been considered justifiable. Under the term spinal irritation, a group of symptoms is, however, comprehended, which not infrequently exists. Every physician, especially one who occupies himself with orthopedics, may see a number of patients who complain of pain radiating to different parts of the body, but who always give the spine as the centre and starting point, without there being, at the same time, any change in the spine to be found, or even a tenderness to any pressure. Some of these patients have, at a physician's request, procured orthopedic apparatus in order to immobilize the spine, others have had to be confined to bed for weeks and months, others again have had to try both these methods of treatment. In several such cases Gymnastics has finally come as a saviour after years of suffering.

For *compression myelitis*, as well as for several other chronic diseases, Gymnastics has been given, and it is justifiable when the object of the treatment is to give the body necessary exercise, to counteract atrophy of the muscles, and to try to keep up the strength during the long confinement to bed. No other movements ought therefore to be given except muscle-kneading on the extremities, abdominal-kneading and small passive extremity-movements. I have taken up this form of illness just to show that the affection itself should not be treated with Gymnastics, and I shall return to this question in describing diseases of the osseous system, because many gymnasts consider themselves justified in treating spondylitis with Gymnastics, a complaint which is one of the commonest causes of compression myelitis.

Tabes dorsalis.

A few cases of this form of disease are treated with Gymnastics every year, and I dare assert that the treatment has, in no case, been without result, as improvement in certain symptoms has always been gained. It is specially worthy of notice that the unsteadiness in walking, and the internal paresis of the intestine and bladder, can be diminished or even, for a time, totally disappear. I consider it, however, to be my duty to point out here that, as far as I know, no return to health has occurred in any case treated. I here quote a case of the disease which I have had occasion to observe and at times to treat during a period of 11 years. This case is of the greatest interest, in that Professor *P. J. Wising*, together with several prominent specialists in different branches, examined the patient and followed the development of his disease. That a change for the worse has taken place during the last few years further proves the correctness of the diagnosis *tabes dorsalis*; which diagnosis, for a time, on account of the improvement gained, was considered doubtful.

Tabes dorsalis in a man aged 32 years, treated 1885—1895.

"A Swedish officer, 32 years of age, without known syphilitic antecedents,¹ had in the year 1878 lancinating pains in his right hand, the following year had them in the right leg, and afterwards in all the extremities—to this was soon added the strange feeling of 'cotton-wool under the feet,' and later on fatigue in walking. In 1880 symptoms from the bladder arose with ischuria paradoxa, and both constipation and paresis in the sphincter, which soon lost its power. In 1884 his walk was ataxic and the Romberg symptom very conspicuous, and the patient presented the pronounced, hopeless figure of an advanced *tabes dorsalis* (incl. the absence of the patellar-reflexes, which have probably been wanting since the end of 1870)."

"In the year 1885, the patient, who had hitherto only received an electric and balneo-therapeutic treatment, and who could now, only with great difficulty, walk short distances in-doors, commenced to undergo a massage- and gymnastic cure at the Gymnastic Orthopedic Institute in Stockholm, and has continued with it every year since for 2—3 months at a time. In the proper manner (although somewhat to the detriment of the process as a mechanical-therapeutic experiment, which was of course not considered) the patient, during the first years, also received galvanisation over the spinal cord and peripheral nerves. As, however, he himself considered the mechanical treatment to be the most important, he afterwards discontinued with the electrical treatment and has, during the last few years, only had Massage and passive movements."

"On the patient's commencing this 'cure,' his condition improved, from week to week, in such a manner, that it not only greatly astonished himself and his friends, but even those physicians, who, from time to time, had examined him. The lancinating pains became, rather suddenly, much weaker, the ataxy and the Romberg symptom retired, the bladder commenced to perform its function, purgations were more normal, and control of the sphincter returned satisfactorily to the patient. The patient was able to take up his duties in his regiment, and, in the summer of 1888, he took part in some short manœuvres, and here once marched nearly 30 kilometres in one day, without this, in any noticeable way, affecting him. This winter (1889—90) he is taking an active part in the social pleasures of the capital."

"When, in March, 1890, I again see the patient, his gate is brisk, but it presents, now and then, deviation from the right line, scarcely noticeable to a non-observant eye. The Romberg symptom appears very slightly, and the patient can easily walk with closed eyes across the room; the lancinating pains appear only after excesses; the feeling of 'cotton-wool under the feet' still exists in a slight degree, the bladder and rec-

¹ Neither has the patient ever received any antisyphilitic treatment (until the year 1891, see below).

tum act almost normally, the tendon reflexes are wanting. From the eyes, which have always been good, nothing can be noticed otherwise than that the left pupil is considerably larger than the right and reacts very badly but clearly—the keenness of sight of this eye scarcely reaches up to 1 (but is over 0.9). A more particular examination by Nordenson, which, however, in consequence of want of time on the part of the patient, does not include examination of the field of vision by means of the perimeter, does not give any other result, the fundus especially does not present anything abnormal in either eye."

To the above description by Dr. *E. Kleen* I only have to add the following.

The condition was on the whole unchanged until the autumn of 1891, when cystitis appeared after gonorrhoea, recently contracted. Incontinence had already previously existed and catheterization had occasionally been resorted to.

The cystitis reduced the patient's strength and the general condition became worse, so that for a few months he had to be in bed. The physician, who attended him at this time, prescribed an inunction-cure, the first the patient had received. He tolerated the process very well, but the tabetic symptoms did not seem to be changed by it.

In the year 1893, an arthropatie tabétique in the right hip-joint was added to the symptoms previously existing, in consequence of which it became necessary for the patient to use crutches when walking. During the autumn of 1895 and the beginning of 1896 he has continued with the inunction-cure.

The condition is, at the beginning of the year 1896, fairly good; digestion, sleep and strength good, and as the muscles have always retained their strength, the patient has always been able to lead an active life. Ataxy has never appeared anywhere except in the legs, and is still inconsiderable, at any rate much less so than at the commencement of the complaint. The patient cannot walk much and must use his crutches even when walking about the room, but he can stand without any support, he can even rest on his right leg in spite of the considerable destruction the hip-joint has undergone. At times the patient suffers from intense lancinating pains.

Although this case must be considered as belonging to the class of cases which, during a certain period, advance slowly or show non-progression in the development of the symptoms, it is, however, of unusually great interest from a Gymnastic point of view. This especially concerns the inward paralyses and ataxy. Incontinentia of fæces and urine appeared early, but just as the patient could not spontaneously empty the blad-

der, neither could he empty the intestine, but suffered from constipation.

Together with abdominal-kneading therefore he received anal-massage and bladder-massage through the abdominal parietes and perineal-massage. The movements he has received have somewhat varied, but the same principles have been followed and the gymnastic prescription has principally been as the following. (The right leg has not been treated since 1893.)

1. Half-lying double arm-rolling, -flexion, -extension.
2. Half-lying double foot-rolling, -flexion, -extension.
3. High ride-sitting trunk-rolling.
4. Forward-lying back-nerve-pressing.
5. Half-lying abdominal-kneading + colon-stroking.
6. Half-lying double leg-muscle-kneading + clapping and stroking.
7. Half-lying leg-twisting +
" " knee-flexion and -extension.
8. Bladder-massage, perineal-massage and anal-massage.
9. Half-lying leg-rolling + leg-up-drawing and out-stretching.
10. Heave-sitting chest-expansion.

This treatment has been carried out in the same manner every year, during the first years by myself personally, afterwards partly or altogether by some assistant. The result of the gymnastic treatment was quite independent of all other

treatment, a fact which could be marked several years in succession. The patient could, as has already been said on page 233, after a few treatments subject urination to the influence of his will; this occurred, even before any specific treatment had yet been given, and this was not only the case with urination but also with defæcation.

It has been mentioned before, that the patient had probably not had syphilis. The inunction cures given have not noticeably changed the condition, whereas, on the contrary, the gymnastic treatment has undoubtedly shown itself to be effective.

Of *progressive muscle atrophy* I have seen and treated a few cases, in which an energetic muscle-kneading together with other gymnastic movements seem to be able to considerably improve the condition. I have had only one patient under treatment a longer time, but, although the atrophy here was pretty far advanced, a very good result was gained after a six months' daily treatment. The patient was sent for gymnastic treatment by Professor *P. J. Wising*.

Pseudo-hypertrophia muscularis or *atrophia musculorum lipomatosa*. This disease, as is known, is characterized by previously healthy children, almost exclusively boys, in their 5th to 8th years, developing an unsteady swaying gait. Certain muscles show an unusual increase in volume, especially the muscles that form the calves of the legs. The increase depends upon an abnormal interstitial accumulation of fat, hence the name, pseudo-hypertrophy.

Sometimes this affection attacks older persons. I have treated several cases.

Pseudo-hypertrophic muscular paralysis in a boy 11 years old when he commenced to be treated in 1878.

He received one month's treatment yearly from 1878 to 1881; further, in the years 1884, 1885 and 1888, 1889 and 1893.

I had occasion myself to observe and treat the patient in the years 1881, 1884 and 1885, but have no notes at hand concerning his case. This description of his complaint is made by Gymnastic Director Miss *Elisabeth Tjäder*, 1896.

The trouble was first definitely noticed when he was about 8 years old, especially in that he tired very quickly when he walked or ran; but real difficulty in walking began first when he was eleven years of age. He was then sent to Sättra Water-cure Establishment, where together with baths he also had Massage. Since the year 1884 he could not walk at all when he came there, but after the treatment he could walk for a few months until 1889. After that time he has neither been able to stand nor walk. He then gave up trying to walk, because he was so stiff that he had to stand a whole hour straining his body before it was possible for him to walk across the floor.

He now presents, in the beginning of 1896, the commonly hopeless form of this disease when it is far advanced; the muscles of the back are quite atrophic, and the left side is altogether the weaker, so that it is difficult for him to keep his balance if he lean somewhat to the left with his trunk.

Circumference of right upper arm		14.5 ctm.,	left 14.5 ctm.
"	"	forearm	19.5 " " 19 "
"	"	upper leg	36 " " 36 "
"	"	lower leg	32 " " 32 "

The measurements are taken on the middle of the upper arm and upper leg and on the thickest part of the forearm and the calf of the leg. The right hand is fairly strong and the patient occupies himself all day long with book-binding.

This case is of great interest from a gymnastic point of view, as it has been proved that one single month's treatment has repeatedly been able to so essentially improve the condition. On my first seeing the patient in the summer of 1881, his gait was extremely bad and unsteady, so that he frequently fell and could then not get up otherwise than in the strange manner peculiar to these patients. After a month's treatment, the muscles were essentially increased, and he walked

much better and more steadily. The improvement gained lasted several months, after which a change for the worse again occurred.

When I saw him next, in 1884, he could not walk at all but, after only one month's treatment, the motor power had so considerably increased that he could once more walk. He continued to walk out in the open air for a few months, until about Christmas, and in-doors until after the New Year, but after this time he became worse again, so that he could not walk when I saw him in 1885. But after a month's treatment he could again walk and was able to do so for some months.

As this circumstance occurred year after year, the supposition should not be quite unjustified, that had the treatment been continued for a longer period, or if it had been more frequently repeated, the patient would probably never have ceased to be able to walk, or, at any rate, this inability would have come on much later. This case shows at least very clearly the great importance of Medical Gymnastics in cases of this disease, and that fairly great hopes may be placed in this remedy.

Acute infantile spinal paralysis or *poliomyelitis acuta anterior* is often treated with orthopedic gymnastics and orthopedic apparatus, because the affection generally occurs at so early a period of life that the deformity, in almost every case, will be somewhat considerable, as the remainder of the body grows normally while the paralysed part of the body does so more slowly. I have already said that the treatment should be commenced as soon as possible, so that atrophy and deformity may be arrested before they have advanced too far, and that treatment in nervous diseases should be as energetic as possible. Regarding infantile paralysis I will only add that the treatment should continue a long time, at least as long as the patient continues to grow and perhaps still longer, so that the best possible results may be gained, for I have seen in a few cases that, under such circumstances, the paralysed part of the body can con-

tinue to grow, after the corresponding healthy part has become full-grown.

It will be difficult to give a certain prognosis, but, if any slight degree of power to move be found in the paralysed extremity, a gymnastic and orthopedic treatment can essentially improve the condition.

CEREBRAL DISEASES

Diseases of the meninges or cerebral substance do not become the subject for gymnastic treatment. *The secondary changes after a cerebral hæmorrhage*, for example, paralyses, can, on the other hand, be treated, and Gymnastics is therefore of use as an after-treatment, but not for the disease itself. As to the method of carrying out the treatment, see page 249.

NEUROSES WITHOUT ANY KNOWN ANATOMICAL CAUSES

These affections have formerly been called *cerebral neuroses* or *functional cerebral diseases*, and Gymnastics has been proved to be of good effect, especially in those diseases which are attended by involuntary tremblings and spasmodic jerks, such as tremor, paralysis agitans and chorea, and in hysteria and neurasthenia.

One case of *pronation- and supination-tremor* in a woman, 20 years old, was treated by me in the year 1884; this case was most interesting in that it led to restored health through a sustained nerve-pressing on the musculo-spiral nerve and median nerve. The patient was observed by Professor *O. W. Petersson*, who also performed the nerve-pressing and thereby

succeeded in stopping the tremor. I have seen the patient several times since and know that the tremor has not returned. The case has been fully described before.¹

In *paralysis agitans*, which is characterized by tremblings in the extremities, declining muscular power, slowness in executing movements and a peculiar forward-bending bearing of the body, certain symptoms can be alleviated through a gymnastic treatment. I have in some cases seen that the trembling has been diminished and that the muscular power and power of movement has been increased.

A physician, 71 years of age, in whom the trembling movements in the arms were unusually intense and attended by pain, declared to me, that no other remedy could so well lessen these tremblings, and check the pain as a few simple gymnastic movements, viz., muscle-kneading accompanied by passive flexions, and extensions and rollings in all the joints of the extremities. This treatment had on occasions to be repeated many times a day.

Chorea minor, *St. Vitus's Dance*, occurs very frequently in childhood and is characterized by non-co-ordinate movements, which may appear spontaneously or when intentional movements are performed. Not infrequently there are, at the same time, some changes in the psychological sphere, so that even every little cause for joy, sorrow, fear etc. produces involuntary movements. As a rule, no definite cause can be found for the affection.

Swedish Medical Gymnastics has, perhaps, been used earlier for this nervous disease than for any other, and the results gained have always been satisfactory.

As has already been said, **double-sided movements with resistance** should principally be used, when the resistance should be very slightly made, and only so that the movements

¹ Nord. med. arkiv 1887, Bd. XIX.

will be co-ordinate. It is a good plan after each movement to apply a slow and light **stroking** on the part of the body treated, by which means a soothing influence is exercised. With such a treatment health has, within a short time, returned in almost every case treated. To give muscle-kneadings, nerve-pressings or Massage in any form I consider unnecessary or even unsuitable, as these movements tend to produce spasmodic jerks. Chorea-patients ought besides to be spared both physical and spiritual over-exertion or over-excitement, as much as possible. I here give a treatment that can serve as a type for most cases. If heart or abdominal disease or any other illness be found at the same time, attention must be paid to it.

- 1) **Half-lying double arm-flexion and -extension.**
- 2) **Half-lying double leg-abduction and -adduction.**
- 3) **Hips-firm sitting alternate-twisting.**
- 4 a) **Stretch-lying head-flexion forward-backward.**
- 4 b) **Stretch-lying head-twisting.**
- 5) **Back-lean-standing double plane arm-carrying.**
- 6) **Stretch-lying double knee-flexion and -extension.**
- 7) **Leg-lean-standing-raising.**

After each movement:—

Stroking on the part of the body treated.

Although the prognosis for chorea minor is generally good, the course of the illness is often slow. A few cases are treated every year with Gymnastics at the Gymnastic Orthopedic Institute.

For *hysteria* and *neurasthenia*, Gymnastics is pretty often given, and it can generally do as much or as little good as other remedies. The treatment will be purely symptomatic, but as some symptoms, such as paralysis, contracture, cramp, paræsthesia of different kinds etc. are very suitable for a

gymnastic treatment; perfectly good results can sometimes thereby be gained. One case may be quoted.

Hysterical paraplegia in a single woman, 32 years of age, treated 1886.

The patient herself is very intelligent and comes of an intelligent family, in which, however, this affection is hereditary; for example, the patient's eldest sister has been confined to bed for hysterical paralysis several years. The patient in question had been in bed during the winter of 1885—1886, paralysed in both legs; she was, besides, anæsthetic, had at times severe vomitings, sometimes hæmatemesis and profuse menorrhagia.

Although the legs were completely paralysed, the patient could, after only 6 weeks' gymnastic treatment, walk with crutches and, after another 4 weeks', could do so without crutches and was fully restored after 5 months' treatment. She has, ever since that time, occupied a very trying position as a teacher. At times she has relapsed and again has required crutches, but was not confined to bed. The treatment consists solely in muscle-kneadings and all kinds of leg-movements, performed during the first part of the time purely as passive movements, but, as improvement went on, executed as active movements and movements of resistance. On two occasions, when the patient had become very much worse, this treatment has been repeated for a few weeks, after which she has soon been able to put aside her crutches and was quite restored to health.

Amongst *traumatic neuroses* are also included some spinal complaints, which have arisen through a severe mechanical shaking of the whole body, as a rule affecting the spine, but without any lesion being observable. Railway accidents, severe knocks, blows or falls are the most general causes, and several writers declare that the symptoms arising do not stand in reasonable proportion to the injury caused. The denomination "neuroses" expresses, besides, that the nervous symptoms, produced by the trauma, do not depend on any very material destruction of the nervous system, but on more minute anatomical changes, which have hitherto not been successfully demonstrated.

English authors call this affection "Railway-spine." Cases of this description prove to be far from uncommon and

the gymnastic treatment has proved to be beneficial—perhaps through the medium of suggestion. A case, treated by myself, which has been published in *Kleen's* hand-book of massage may be quoted here.

Railway-spine. Commotio medullæ spinalis in a man, 31 years old, treated 1889—1890.

He was shaken 10/1 1888, in a railway-accident at Bradford in Massachusetts, and was conveyed in an unconscious state and badly bruised, to the Hospital at Haverhill. The case showed the usual acute symptoms; after these had had time to subside, a pronounced paresis remained in the left leg together with sensory disorders. The patient underwent treatment in America for 1½ years without this bringing about any improvement.

On 19/9 1889, he commenced a gymnastic treatment at the Gymnastic Orthopedic Institute in Stockholm. The patient was then unable to walk at all on account of the paresis in his left leg, which measured nearly 2 ctm. less in circumference than the right.

The patient suffered from severe pain in the back; at times of the nature of a girdle-pain, and further, from palpitation and scarcity of breath, insomnia and general neurasthenia. A sudden improvement now took place in the hitherto stationary condition. When the treatment, 18/12, was interrupted for a time, the patient could walk without support, and the leg was considerably strengthened. In March 1890, the legs are of about the same thickness, the patient walks well without support, but soon becomes tired in his left leg, and this then causes a slight unevenness in his gait; the sensory symptoms have disappeared. He continued the treatment until the end of May 1890, and improved still further, so that he was discharged as cured.

DISEASES OF THE MUSCLES

Atrophy, contracture and myositis are the muscle diseases, which are generally treated by Gymnastics. Muscle-kneading is here perhaps the most important movement, and it has frequently been pointed out, how an energetic muscle-kneading increases the nutrition in the muscles and that even the motor power is, at the same time, increased; Direct examinations have proved, that Massage and especially muscle-kneading, given during 2—5 minutes, double the unit of work which the healthy muscle can perform.

It stands to reason, that the muscle-kneading ought thus, better than any other movement, to restore the functional power of the muscle, when this has been destroyed by some cause or another. But, as a rule, too much muscle-kneading or Massage and too few movements are given, for the simple reason, that most masseurs are more or less ignorant of Gymnastics. In order that a morbidly changed muscle shall become active, it is necessary that it be placed in such a condition or position, that its power of contraction can really come into play. On all those occasions, when the muscle is abnormally shortened or stretched, as in diseases of the osseous system with deformity of any part of the skeleton, after external injuries and surgical operations, in muscular contractions after paralyses etc., the gymnastic movements are therefore at any rate as important as the muscle-kneading.

A typical and powerful **muscle-kneading** can, as has already been said, only be given on the extremities, shoulders

and hips, i. e. on those parts of the body, where the muscles are found in fullest measure and are more movable in comparison with the under-lying bone, and more displaceable in comparison with the over-lying skin, so that the special muscles or groups of muscles can, so to say, be raised and taken hold of with the hands. In treating the muscles of the neck and throat, **neck-muscle-sawing** (see page 64) is used as well as the kneading proper. The muscles of the back are best treated by means of the so-called **back nerve-pressing**, which is really a muscle-movement (see page 69). On other parts of the trunk, where the muscles cannot be gripped between the hands, it is so treated that the fingers or hand press it and squeeze it against the under-lying part (compare the description of **pétrissage**, page 154).

Besides these different forms of muscle-kneading, in the treatment of the muscles, **muscle-hacking**, **-clapping** and **-beating** are also used. The importance of these movements has previously been pointed out. Muscle-hacking can be given over all parts of the body, muscle-clapping ought not to be given otherwise than on the extremities and back, and muscle-beating only over the hips and downwards over the outer and inner sides of the legs.

All active and movements of resistance could reasonably be called **muscle-movements**. Their effect is seen from the very names of the movements, for example, flexion, extension, twisting, or else their effect has been sufficiently treated of in the description of the movements, to make it unnecessary to repeat it here. Besides, it is easy enough for an examined and practised gymnast, and even for every physician, to find out the muscle-movements, which are the best and most effective in each special case, by reason of the purely anatomical knowledge they possess.

On *muscle atrophy* and its treatment, enough has already been said in the description of the treatment of diseases of the nerves. The most common causes of muscle atrophy are ner-

vous diseases of a central or peripheral nature; further, deformities of osseous parts and inflammation in the joints and external injuries, which bring about diminished mobility for a longer or shorter time and thereby cause atrophy occasioned by inactivity; even long confinement to bed gives rise to this kind of atrophy. Finally, certain affections of the muscles themselves are attended with atrophy.

How *muscle-contraction* is best treated has also been pointed out in connection with the description of nervous diseases, to which I beg to refer; at the same time I consider it necessary to remind the reader of the great importance of the orthopedic apparatus in contractions, and that the excentric movements are here of the greatest use.

Myositis or *muscle inflammation* is an affection that much occupies gymnasts and masseurs. Myositis can arise from different causes; generally they are perhaps of a rheumatic nature, but even external injuries of different kinds and too much work and especially too one-sided work are somewhat common causes of myositis. Whatever the cause may be, the symptoms assert themselves in the same way—pain and ache when working with the diseased muscles; diminution or cessation of function; tenderness on pressure; besides which a distinctly palpable swelling of the muscle may frequently be observed. The treatment will be the same in every case, namely, in the first place, a powerful muscle-kneading, then passive movements and finally active ones.

It is true, that myositis can occur in nearly every extremity and trunk muscle, and that they are thus extremely common, but they are not by half so common as all bath-assistants and bone-setters, and most masseurs and gymnasts imagine, for nearly every patient, who has once in his life been treated by such persons, has always got "muscle-lumps," quite independently of the complaint which has led to the treatment. Myositis, in a word, is mistaken by the less experienced, and those unaccustomed to palpation, for almost everything, gen-

erally for cellulitis, inflammation in the joints, bursæ, synovial sheaths, bone etc. I consider it here unnecessary to describe cases of myositis, as it is certain that every medical gymnast has observed such cases, and every hand-book on Massage gives full descriptions. I refer to *Kleen's* hand-book which describes several cases, with different causes of the affection.

CONSTITUTIONAL DISEASES

Under this head are generally included diseases of the blood and blood forming organs, and diseases which have their origin in a disturbed metabolism. In the former group are included anæmia, chlorosis, hæmophilia, etc.; in the latter are included fatty degeneration, gout, diabetes, rickets, etc.

A generally strengthening treatment is necessary in the above-mentioned diseases, as well as in many other affections, but often even when no special trouble exists, about which more will be said further on under dietetic Gymnastics. Diet-, spring- and bath-cures, nutritious food and strengthening medicine are the most general ordinations and in most cases they are sufficient, but Gymnastics is even here of great importance, in some cases perhaps mostly as supporting the effect of the above-mentioned means, but in others as the remedy which is the most beneficial.

Constitutional diseases often depend on too little physical exercise in general, on poor appetite and inefficient utilization of the food, and the consequently disturbed metabolism and lack of blood formation. That Medical Gymnastics, better than any other means, compensates for the muscle and physical work necessary to the well-being of the body, has been pointed out before. Through the muscle-movements, the nourishment, taken into the body, is consumed and best turned to account and, at the same time, the necessity for an increase of nourishment is produced; the circulation of the blood will be more active, the quantity of blood will be increased and, at

the same time, an increase in all the tissues and organs of the body will arise.

No speedy results can be expected from Medical Gymnastics, as little in constitutional diseases as in local. The effect of Gymnastics, on the contrary, comes slowly, but it will be of longer duration than that of many other remedies.

In *anæmia*, *chlorosis*, *general weakness*, and several other conditions of disease Pedagogical Gymnastics has been considered to be sufficient. It should be so when performed according to *Ling's* system which is based on anatomically physiological grounds, but Medical Gymnastics is preferable in every morbid condition, as it can more directly attack each symptom. The gymnastic treatment ought, in the affections in question, not only to strengthen the constitution in its entirety but even to work purely symptomatically. Pedagogical Gymnastics can not, as do the Medical, allow of any individualisation, which, however, is absolutely necessary in all treatment of the sick.

If the symptoms from the organs of digestion be present, such as poor appetite, pains in the stomach, constipation, or if palpitation, shortness of breath, myalgia and feelings of fatigue or purely nervous symptoms are simultaneously present, or, if some symptoms are more marked than others, each one of these symptoms is treated, as previously described under the special diseases. A careful observance of individualisation and method of procedure on commencing the treatment for these affections will be as important as for any others. It would therefore be best to begin with purely passive movements and afterwards gradually increase the movements in strength and number, and the time for treatment, as has been pointed out under the general rules, page 156. To prove the necessity for care, I need only mention the susceptibility to palpitation, headache, fainting, etc., that anæmic and chlorotic patients often have. Besides I have—especially amongst this group of patients—found the most of those who abandon the

treatment if they do not after the first few days or weeks find it beneficial or agreeable, although any contra-indications for the treatment can not be discovered.

It should be unnecessary here to give any gymnastic prescription, as the treatment of diseases in most of the organs of the body has been already properly described, but somewhere in the work there should be a generally accepted gymnastic prescription given and perhaps it is most suitable here. The arrangement that is used at the Gymnastic Central-Institute and Gymnastic-Orthopedic Institute is principally to the following effect:—

- 1) **Respiratory-movement** : chest-lifting, chest-expansion;
- 2) **Passive leg-movement**: leg-muscle kneading and -clapping, leg-nerve-pressing, foot-rolling, leg-rolling;
- 3) **Active leg-movement** : knee-flexion and -extension, leg-twisting, leg-abduction and -adduction, leg-updrawing and -out-stretching, etc.;
- 4) **Passive arm-movement** : (compare 2);
- 5) **Active arm-movement** : forearm-flexion and -extension, double plane arm-carrying, double arm-flexion and -extension;
- 6) **Trunk-movement**: circle-rolling, trunk-rolling, alternate-twisting, plane-twisting, arch-twisting;
- 7) **Passive back-movement** : back-nerve-pressing, back-hacking and -clapping;
- 8) **Active back-movement**: sitting raising with back-stroking, sitting spinal-raising, leg-lean-standing raising;
- 9) **Passive abdominal-treatment** : abdominal-kneading, colon-stroking, abdominal-shakings;
- 10) **Active abdominal muscle-movement**: backward-falling, sit-lying raising;

- 11) **Head-treatment**: head-hacking, head-nerve-friction;
- 12) **Respiratory-movement**: chest-lifting, chest-expansion, double arm-lifting.

Free-standing movements (see page 145). In the treatment the general rules are followed; at first exclusively passive movements are given, finally, purely active ones. Where several movements are upon the ordination, the weakest are first named with a gradual progression to the strongest, so that a suitable choice is, in every case, easy to make. Free-standing movements ought not to be taken until active movements are predominant in the Medical Gymnastic treatment.

Of *hæmophilia* I have only treated one case, but consider that Medical Gymnastics ought to be a good remedy for this disease and for this reason it is described here.

Hæmophilia in a boy, 9 years old, treated 1885—86. The case is more fully described in *Hygiea*.¹ The treatment was given in the form already described under heart disease.

A tendency to bleeding commenced to show itself in the second year of the patient's life and appeared as ecchymoses under the skin all over the trunk, especially on the lower part of the chest and abdomen; later on around the joints, from the gums of the teeth and from the so-called roots of the nails. Exudation in the joints commenced when the patient was 2½ years old and often recurred after this time. Bleeding never occurred from the inner organs, which seemed to be perfectly healthy.

In October, 1885, a *general gymnastic treatment* was commenced together with *Massage* on both the knee- and foot-joints, in which exudation used most frequently to occur. The treatment brought with it a noticeable improvement. Exudation and swelling in the joints named occurred several times during the course of treatment, but disappeared in a few days, whereas before they usually remained for weeks; longer intervals between the attacks also ensued.

The general condition was remarkably improved during the period of the four months that the treatment continued, so that when the boy was shown to the Swedish Medical Society, Dr. *O. Medin*, Professor of diseases

¹ Förhandlingar vid Svenska läkaresällskapet år 1886, sid. 87.

of children at the Medical High-school in Stockholm, who had been consulted and urged this treatment, said "that it was very pleasing to see how considerably stronger the boy looked after the gymnastic treatment."

Obesity (Polysarcia) is often treated with Gymnastics. Too little exercise together with too much food and drink are the most general causes of the complaint. A diet cure, carefully persevered with, can be sufficient to check the evil, but as symptoms of muscle weakness, shortness of breath, of fatty infiltration of the heart and of disorders in the circulatory organs commonly attend the cure of obesity, and as Medical Gymnastics has a number of movements that diminish or arrest these symptoms, it should be as justifiable to use Medical Gymnastics as any other remedy. It may be necessary to continue the treatment for a long time and to frequently repeat it, if perfectly good results are to be gained, for this kind of patient willingly returns to his old, unhealthy habits of life, when a change for the worse will immediately take place. *Nebel* very correctly says, that troublesome symptoms can disappear and a feeling of ease can, during the course of the treatment, come to patients who suffer from obesity, without a diminution in the weight of the body simultaneously taking place. The adipose tissue has diminished, but the muscles have increased. I only wish to add here, that if only the patient will continue the treatment energetically enough and for a sufficiently long time, a turn of the scales will finally show the result attained. Sometimes very sudden results may be gained, as the following case shows.

Obesity in a man, 48 years old, treated 1887.

He was stoutly built, of average height and, at the commencement of the treatments, weighed 111 kilograms, and suffered from the above-mentioned symptoms. He had lived well and consumed a fair quantity of spirits, especially of Swedish punch. The treatment was arranged so that circulation was aided, that deeper and more complete respirations were brought about, that the muscles were strengthened by a slow but continual increase of movements. Partial diet was prescribed. The pa-

tient would not deny himself his glass of spirits before, and his ale at dinner, but diminished the quantity of spirits and drink generally, and principally lived on animal food. After a month the weight had diminished 9.5 kilo., after two months by another 5 kilo. During this time the patient had been able to resume his work. He discontinued the gymnastic treatment, but continued on a restricted diet and has thereby kept his weight under 100 kilo., and has all along been able to work.

Obesity in a man, 64 years old, treated 1895 by Gymnastic-director *W. Lindblom*.

The weight was reduced 20 kilo. by two months' treatment, whereby some of the troublesome symptoms were alleviated, although, at the end of the treatment, the patient still weighed 150 kilo.

For articular gout (*arthritis urica*) and for chronic rheumatic arthritis (*arthritis deformans*) or *inflammation*, gymnastic movements have been used and considered beneficial. According to my experience, Gymnastics cannot be tolerated by all such patients. Certainly attacks of *podagra* can be arrested by movement-treatment, best by constant Massage, and I have, myself, on a few occasions, succeeded in quickly alleviating such attacks in the same patient, but it must be admitted that this treatment causes the patient such great pain that very few would be likely to submit to repeated treatment. The question will therefore be, whether or not one is justified in subjecting the patient to greater pain than he had before. As a prophylactic means, on the other hand, a gymnastic treatment should be fully indicated for gout.

In *deformed joint inflammation* I have tried Gymnastics at the request, both of doctors and of the patients themselves, but only in a few and somewhat slight cases has any real improvement been gained. Possibly, in the first phase of the affection, movements perseveringly employed might prevent the deformation from developing itself so rapidly. To give Massage and Gymnastics on joints, in which the synovial membrane, articular cartilage and perhaps even the articular surfaces of the bone are already destroyed, must be looked upon not only as useless trouble, but also as culpable from the point of view

that no improvement can be gained, but that increased pain is caused the patient.

Diabetes mellitus. Even for this disease a well arranged movement-cure should be of importance, together with dietetic prescriptions. It has sufficiently been pointed out above that muscle movements are of great importance for the assimilation of food.

First of all then, a general muscle-kneading ought to be given, with, at the same time, passive circulatory furthering movements of all kinds, and finally active muscle movements, in the same degree that the strength of the patient increases. That a careful method of treatment and strict individualisation are necessary in treating so serious an affection as diabetes need scarcely be said. The diminution in the amount of urine and sugar are the surest signs of the result gained. I have only had a few patients with diabetes for gymnastic treatment, but not a sufficient number nor of long enough duration to express an opinion as to the importance of Gymnastics here. I have treated far more with bath- and water-cure and seen such great benefit result from the same, that I must certainly put the gymnastic treatment in the second place. That Gymnastics has not been used to any extent here in Sweden for this complaint is perhaps explained by the fact that, according to the Reports to the Medical Direction from the Gymnastic Institutes, diabetes does not occur in quite $\frac{1}{2}\%$ of all the cases treated each year.

In cases of *rachitis* or *rickets* and *scrofula*, a generally strengthening gymnastic treatment should, according to what has been said in the introduction to this chapter, be considered as fully indicated, and it has, ever since *Ling* arranged his system, always been used for these affections.

I shall return to the more special gymnastic treatment of certain forms of rickets in the description of diseases of the bones and joints. For the composition of a gymnastic prescription for general treatment, sufficient has already been said.

DISEASES OF THE BONES AND JOINTS

In the gymnastic treatment of a joint, it is of the greatest importance to know the physiological limits for every one of its movements. This holds good for gymnastic movements in the joints generally, but it is especially of importance that the normal limits be not exceeded in the treatment of a swollen or stiff joint, which easily happens in the attempt to gain the greatest possible mobility in the joint. The normal limit for a certain movement in a joint is certainly fairly particularly determined and given in medical literature, but there are individual differences, and, besides, the limits can be determined in any special case by letting the healthy extremity perform the movement itself, or to let someone else do it. I mention this because I have seen gymnasts and even physicians commit the unfortunate mistake of exceeding the normal limits when they have given the movements, or have tried to give movements which are impossible in the joint treated, of which more further on. If the mobility of the joint be limited, it is necessary to determine, on examination of each case, whether the cause of the affection is to be sought for in the joint itself and in the parts belonging to the same, or in the vicinity of the joint, such as in the synovial sheaths and bursæ or, finally, in the external soft parts, i.e. muscles, skin and sub-cutaneous tissues. If the parts of the joint be sound, as in a serous exudation, after a distorsion or luxation, the diminished mobility remaining ought to be completely overcome by means of Gymnastics and Massage. If the joint, on the contrary, have un-

dergone any great deformity, as after a long chronic rheumatism, or a fracture of the parts of the joint, an arthritis deformans or, still more, after a resection of the joint, it is, of course, of the greatest importance that the special case be closely considered before the making-up of a rational treatment, so that, in endeavouring to gain too great mobility, the patient be not caused unnecessary pain, besides perhaps doing him more harm than good.

A strict examination of a joint not only requires knowledge of the normal formation of the joint and of those illnesses generally occurring in the joints, but also great practice and care in the examination. It is best first to examine the *active movement power*, which is determined by the patient performing all the movements that can be made in the joint in question, to the extent possible to him. The examiner then firmly holds the extremity in question and performs the movements with it, without the patient helping at all or being allowed to make resistance, by which means the *passive mobility* is examined in all directions and to the greatest possible extent. Generally the passive mobility is somewhat greater than the active. In order to gain full knowledge of the morbid changes and of the power of movement dependent on the same, in a joint, it is sometimes necessary that the examination be made with the patient under chloroform.

The measuring of movement angles is of diagnostic importance and by means of repeated measurements during the course of the treatment, a sure expression of the results gained is also obtained. The *angle-measurer-compass*, used at the Gymnastic Orthopedic Institute (shown in fig. 84), is simpler and more practical than most other angle-measurers. By means of the screw-key both the angle-arms can be fixed at any angle between 0° and 180° . The side-scale is afterwards fastened on to the angle measurer, and reading takes place.

The common *calipers* (fig. 85) are also of use for the measuring of the different diameters of a joint, and also for measuring the diameter of the chest. Both the simple instruments mentioned ought to be found in every gymnast's possession.

The circumference of the joint is measured with an ordinary tape measure. Very correct numerical expressions can thus be obtained of the swelling of a joint in its entirety and in any special direction and for the diminished or increased mobility in a joint.

After the above-mentioned examinations have been made, *palpation* of the joint is commenced, in which no single spot of the same should escape the fingers of the examiner, while



FIG. 84.



FIG. 85.

special attention is paid to the different parts of which the joint consists, such as the joint capsule itself, fibro-cartilages, strengthening ligaments, osseous surfaces and the bursæ surrounding the joint, tendons, muscles, skin and sub-cutaneous tissues, as has been previously mentioned. The examination by palpation ought to partly consist of direct pressure on the joint and partly of pressure with simultaneous forward-pushing of the soft parts covering the joint, when tenderness to pressure is best observed in the joint and irregularities in the

joint capsule or on the surfaces of the joint. Irregularities in the synovial membrane of the joint are also observed, in this way, the one hand is laid over the joint while both the active and passive movements are performed. If irregularities exist, the examiner will experience a sensation of the characteristic scraping or *crepitation*, oftenest only felt, but if the irregularity be greater, also heard. In most cases the patient has himself previously observed the presence of crepitation and mentions the circumstance. Exudation in a joint is best observed, when the joint is firmly clasped, to as great an extent as possible, with the one hand, when the contents of the joint can be pressed to different parts of the joint, best toward that part where the joint capsule is widest and least tautly united with tendons and ligaments. Through the stroke of the free hand against the previously mentioned convexity made, the quantity of liquid will, as it were, be contained between the hands, and then the characteristic sensation of so-called *fluctuation* will partly be felt, and the quantity of liquid fairly correctly judged. In exudation in the knee-joint, the examiner, with his one hand, exercises pressure on the upper part of the capsule, while slight pressure is made on the knee-cap with the other hand, by which even the most insignificant accumulation of liquid can be felt, because the knee-cap will be lifted up and gives the characteristic or "riding of the patella."

Everyone, who much occupies himself with the treatment of joint diseases, soon finds that it is principally certain parts of each joint that are morbidly changed and tender to pressure, about which more will be said in mentioning the special joints.

In treating a *sprained joint* or *distorsion*, it is best to very soon commence with Massage and passive movements. The most suitable time to begin this treatment, in most cases, will be, I think, immediately after the occurrence of the injury or at least as soon as the swelling is no longer on the increase, i.e., after a few hours or, at the most, a day. Ice bandages should be applied in the ordinary manner so long as the swelling increases; afterwards warm damp bandages and compres-

sion, at least as soon as the swelling begins to diminish through the Massage and movement-treatment. Active movements ought not, in my opinion, to be immediately allowed. If there be any fear of hæmorrhage in the joint, a circumstance that does not so very frequently occur, all movement-treatment should be put off, even the passive.

If any *extremity* has been *out of joint*, i. e. if a *dislocation* has occurred, it is necessary almost in every case to fix the joint, at least during the first few days, but this does not prevent one from occasionally undoing the fixing bandage and giving passive movements to the joint. In this way there is least fear of the joint becoming stiff.

Even in cases of *fracture* in the vicinity of a joint, it can in some cases, for example, in fractures of the radius, be of importance that the fixing bandage should not remain on too long, but now and then be taken off and passive movements performed. I will further on explain this by means of a few cases. To treat fractures *only* with Massage and Gymnastics without simultaneous fixation is, on the contrary, in the highest degree culpable, but I have seen gymnasts do this. Even if a shortening of the extremity has not resulted through or immediately after the fracture, contracture of the muscle can afterwards cause a shortening, so that a fixing bandage should always be used in every fracture of the bones of the extremities.

During the last few years I have had cases for *after-treatment following surgical operations* such as scraping and partial resections, and have thereby discovered that very much can be gained by an energetic and prolonged treatment, lasting in some cases for years. This after-treatment has become more necessary in the same degree that surgery has become more conservative. I point this out, because I have seen that the after-treatment has sometimes been of as great use as the operation, and that much has remained to be gained after the patient has been discharged as "cured" from the hospitals,—but it is scarcely to be expected that surgeons with a practice will carry on the after-treatment in cases that require such

prolonged attention. The gymnast with private practice seldom can do so, as the pecuniary returns seldom or never correspond to the labour expended, in consequence of which only the larger Gymnastic Institutes that treat patients without payment are able to receive them.

In the treatment of the joints the necessity for a careful choice between Massage and Gymnastics shows itself more than otherwise. In an *acute synovitis*, in a swelling in and around a joint after a *distorsion*, a massage-treatment can be sufficient to give restored functional capacity, but whenever the object is to overcome a *stiffness in the joint*—for example, after a *dislocation*, a more considerable *contusion* or a *rheumatoid arthritis*, which are the commonest causes of stiffness, then the gymnastic movements are as important as Massage and the more so, the longer the stiffness has existed. If some time has elapsed between the occurrence of the injury and the commencement of the treatment, then Massage alone cannot accomplish much, but an energetic movement-treatment becomes of necessity. The movements must often be continued long after the swelling, ache and pain in the joint have subsided, that is, after the Massage is superfluous.

The best results are gained therefore if, from the beginning of the treatment, Massage and Gymnastics are given in a proper combination, after which Gymnastics is continued until perfectly good results are attained. Massage on the joints is best given in the form of **effleurage** and **massage à friction**. In acute joint complaints effleurage is sufficient (see page 153); in the chronic, massage à friction is best; but always alternating it with effleurage, which ought also to begin and end every massage-séance. In chronic affections, **clapping** over the joint can also advantageously be given, whenever the object be to produce a more lively reaction. The pain that clapping occasions to the skin is essentially taken away if a massage-towel be firmly spread over the joint, so that the clappings do not meet the bare skin. In other respects, as regards the

technique of massage-treatment of the joints, I refer the reader to handbooks on Massage.

As regards the movement-treatment proper, all the **gymnastic movements** should be used that can be performed in the joint of question. Passive movements are sufficient to begin with, and these ought not, on commencing the treatment, to be done in every case to the full extent that the formation of the joint permits. In the after-treatment of a dislocation, for example, it will be enough to keep the movements at first within the central movement region of the joint, even if changes in the joint offer no hindrance to greater movements. If the stiffness in the joint be considerable, no typical movements can in general be performed; this will also be the case, if the movements cause pain when the patient makes resistance in the performance of the movements. The resistance is best overcome if the movements be performed under tremble-shaking, whether it concerns **flexion, extension or twisting**. **Rolling** is of the greatest importance in all those joints where it can be given, partly to increase the mobility, partly on account of its circulatory-furthering effect. It is especially in swollen joints that this effect is best seen. Rollings are, besides, not more painful than massage-movements and can therefore be used even in acute joint affections.

After passive movements have been employed some time and proved themselves to be well tolerated, the patient is allowed to perform purely active movements and even movements of resistance when such are indicated.

That movements are the most effectual means to *gain increased mobility* in a joint, it is easy to understand.

But there are some cases where movements can even *diminish an abnormally increased mobility*, which circumstance has not been perceived and admitted by all. In *rachitis*, abnormal mobility often occurs in several joints, for example, abduction and adduction in knee- and elbow-joints. Under such circumstances movements performed only in the direction that ought normally to be found, can improve the condition to an essential degree. Through the movement-treatment the joint capsule,

ligaments and the surrounding muscles are strengthened, by which the abnormal mobility is diminished. Orthopedic apparatus can certainly serve to keep the mobility within normal limits, but they cannot always be tolerated and they never help to strengthen that part of the body on which they are put. Gymnastics ought, therefore, always to be used, as far as possible, together with orthopedic apparatus, especially in the treatment of rachitic bone and joint deformities. Under other circumstances orthopedic apparatus are necessary to give in cases of abnormal mobility necessary support, to keep the movements within normal limits, and thus render the joint capable of being used; for example, after external injuries in otherwise healthy persons.

Most of those joint diseases that are generally treated with Massage and Gymnastics have already been mentioned, but before I pass on to the description of cases of the disease treated, I consider it my duty to touch somewhat upon the treatment of *tubercular joint inflammation*. I will here point out that it is, in general, extremely difficult in diseases of the joints to determine quite an exact diagnosis and, consequently, to put down sure indications for the treatment. It is of great importance to make the diagnosis of tuberculosis in time, for if it be certain that this disease exist, rest in the joint, according to the now conceived idea, is the only proper treatment. It is, however, sometimes necessary to treat such cases with Gymnastics and Massage, where tuberculous joint inflammation may be suspected to be present. The risk with this treatment lies in the fact that it can produce a metastasis of the tubercle bacilli.

In several of those cases suspected of tuberculosis health has been restored, and it has then hitherto been said that the diagnosis given had probably been incorrect. In each such case treated by myself the diagnosis has been clinical. Although I consider a gymnastic treatment prudently gone through to be harmless, especially if it be discontinued in proper time in case a change for the worse should take place, my experience, however, is not of sufficient extent, and the methods of examination are still so uncertain, that I would not dare

express any decided opinion or consider myself justified in advising any more extensive use of this means in suspected tubercular inflammations. But what I will say is this, that non-medically educated gymnasts ought to refrain from treating such joints, unless a physician has recommended the treatment. I express this opinion for several reasons. I have seen certificated gymnasts about to massage abscesses; in one case an abscess from the hip-joint, reaching to the middle of the thigh. I have often to dissuade from Gymnastics and massage treatment in joint diseases, even when it has been recommended by—from a technical point of view—fully competent gymnasts, who are, in addition, both certificated and qualified. It not infrequently happens, that when a surgeon has advised an operation, the patients are afraid of it, and apply instead to gymnasts and masseurs who undertake the treatment with the assurance that the operation will be unnecessary. Sometimes such can in fact be the case, but then, generally, a very long treatment must be given, perhaps also with poorer results than a simple surgical operation quickly performed. Even if, in most cases, the mechanical treatment cannot be said to do any direct harm, much valuable time is, however, lost, by which the prognosis for the surgical operation has been made considerably worse in such cases where at last an operation must be undertaken.

A short account will be given of the different movements in the joints of the extremities and of a few of the cases of affection treated that are characteristic for the joint in question or else for those cases commonly occurring.

The shoulder-joint.

In the shoulder-joint *flexion* and *extension*, *abduction* and *adduction*, *twisting* and *rolling* can be performed. The movements most used are the following:—

Arm-flexion and **-extension**; **arm-carrying** and **arm-swinging**; **arm-lifting**, **arm-flinging**, **arm-twisting** and **arm-rolling**.

Amongst complaints in the shoulder-joint which are objects for mechano-therapeutics, the commonest are dislocations and contusions. According to a statistic by *Gurlt*, *dislocations of the shoulder-joint* form more than 50 % of all dislocations, which depends on there being a real predisposition to dislocation in the joint on account of its anatomical and mechanical construction. For the *cavitas glenoidea* of the scapula forms only $\frac{3}{4}$ of the corresponding surface of *caput humeri*, and the joint is, as the reader knows, the most mobile in the whole body. That *dislocation by means of hyper-abduction* of the arm is the one commonest occurring, depends on the long lever that is formed by the out-stretched arm.

Contusions of the shoulder-joint are rather common, and they generally occur on the anterior surface of the joint in falling forward. Such contusions occasion considerable tenderness and stiffness in the shoulder-joint, and cause, as do dislocations, atrophy of the shoulder-muscles.

In examining the shoulder-joint, one should never omit to see if tenderness to pressure exist on the front of the joint and, if such be the case, to massage the part. The joint capsule is most easily accessible to Massage from the axilla, but as the arm in the case above given, at least during the time immediately after the occurrence of the injury, can be abducted but inconsiderably, one must as far as possible seek to massage the joint through the surrounding soft parts and, besides, try to gain increased mobility by means of gymnastic movements. In examining the shoulder-joint, the bursæ surrounding the joint should not be forgotten. It is of advantage if an assistant be at hand who can firmly fix the scapula, while the mobility in the joint is examined. Such a fixation is very often also necessary in the treatment of joint-stiffness that has existed some time.

The elbow-joint.

Forearm-flexion and -extension and

Forearm-twisting are the only movements that can be

performed in the elbow-joint. It has previously been pointed out that the twisting ought not to be mistaken for rolling, a fact which is of such importance, that I again remind the reader of it and refer him to what has been said on the subject on page 125.

The elbow-joint is often an object for gymnastic- and massage-treatment, as diminished mobility arises here from several causes, such as *dislocations*, *fractures* of different kinds and inflammation in the joint itself.

The traumatic luxatio cubiti is, according to *Gurilt's* statistics, next to shoulder-joint dislocation, the commonest; it occurs in 27 % of all dislocations and generally arises through hyper-extension in the elbow-joint, in consequence of which the forearm is dislocated backward. Simple dislocation of the capitulum radii is not infrequent in early childhood; this dislocation oftenest occurs in a forward direction. Dislocations in the elbow-joint seldom require any after-treatment if they be reduced in proper time.

Fractures also rather frequently occur in those bones which are included in the formation of the elbow-joint, and, not infrequently, dislocations in the elbow-joint are combined with fractures; fractures of the condyles and epicondyles of the humerus, fracture of the olecranon, fractures of the coronoid process of the ulna, fracture of the neck and head of the radius can occur alone or many together. The fracture of the epicondyles is one of the fractures most commonly occurring. To determine correct diagnosis in every case is by no means an easy matter, at least not immediately after the occurrence of the injury, as the swelling of the surrounding tissues can be very considerable, but a proper diagnosis is, however, of great importance for the treatment. In cases of tubercular and suppurative inflammation in the elbow-joint the destruction of the parts round the joint generally covers so great an extent that partial or total resection must be resorted to. In such cases the mobility in the elbow-joint and the functional capacity of the arm will be almost nil, unless an after-treatment be given, but in many cases I have seen that a considerable working-

capacity can be attained by means of an energetic and lengthy treatment, even where the destruction in the joint has been so considerable that resection has had to be resorted to. Stiffness in the joint after a resection, can arise partly through muscle-contracture, partly through union of the resected osseous surfaces; in a total resection the risk of such an ankylosis occurring is considerably less than in a partial resection.

Whatever the cause may have been for the existing stiffness, as much importance in the treatment must be laid upon the performance of flexion and extension as upon pronation and supination, first with passive, afterwards with active movements. The treatment is best given, both for Gymnastics and Massage, in the position shown in fig. 70.

The elbow-joint is pretty easily accessible to Massage in all its extent.

Tenderness to pressure often arises about and above the capitulum radii, also in other normal conditions in the joint.

If the elbow-joint, through some greater injury or through retarded treatment, has assumed a position of acute flexion, the extension-apparatus, fixed by means of the so-called "endless screw," is easy to apply to the arm and is of essential use.

The wrist.

Wrist-flexion and -extension and

Hand-rolling are the only movements that can be performed in the wrist. Flexion and extension are, as has already been said, generally abbreviated to the term "flexion." (Compare page 93.)

The wrist is, according to *Hueter*, the joint that man has the greatest need of; one's utmost efforts ought therefore to be expended in order to check disturbed function in this joint, for even an inconsiderably diminished mobility hinders most of the ordinary occupations of life.

Dislocations in the wrist extremely seldom occur, but fractures at the lower end of the radius are very common and are frequently mistaken for dislocations. The radial fracture con-

stitutes about $\frac{1}{3}$ of all fractures. Fractures of both the forearm bones simultaneously occur also pretty often and generally have their site on the lower third of the forearm.

As concerns the treatment of these fractures, the methods of procedure still recommended in most hand-books of surgery and which are therefore generally used, are far from being the best. They state that a plaster bandage or splint ought to be kept on children for three weeks at most, and for 4 weeks at most on older persons, and that the bandage can lie untouched until complete consolidation of the fracture has resulted, unless a non-diminution of the swelling at first existing necessitates a change of bandage. By such a method of procedure one brings about immobility in the wrists of the patients, especially the elderly ones, and, in most cases, this is extremely difficult to restore; many a time the results obtained are incomplete even with the best possible after-treatment. At the surgeries in Stockholm a change of bandage has, for several years, been made once a week, when movements have been performed in the stiff wrist. I have, through careful observation of cases treated, gradually come to the conclusion that, in the simple fracture of the radius, most good is done to the patients if the bandage be changed daily and movements be performed in the wrist- and finger-joints, of course observing that a firm and sure fixation of the fractured part is made.

Right-sided *fracture of the radius* in a woman, 62 years old, treated 1892.

She was healthy and strong for her age. As she was going to the Gymnastic Orthopedic Institute, where she was the eldest assistant, she fell on her face and fractured the radius of the right arm. She was immediately treated with the ordinary Nelaton's pistol shaped splint and ice-bandages. As early as the following day the swelling had subsided, so that the bandage required changing. On this, a light effleurage was given the forearm, and small, passive movements in the wrist- and finger-joints. This treatment was repeated daily. The movements were gradually increased in degree and the patient at last had to perform active movements, but always with a safe fixation of the fractured part. After exactly one month the splint and bandage were removed, as the fracture

was completely healed. The patient had perfectly good mobility and strength in her hand, could resume treating her patients at once and was able to give them movements just as well as before.

The carpal joints.

Dislocations, inflammations and contractions occur also in the joints of the carpus. The mobility in these joints is not considerable, but in the movements of the wrist previously described, the joints of the carpus have also their share. In *synovitis* in the joints of the carpus, the separate bones can sometimes be rather freely moved in relation to each other.

In *suppurative tendo-vaginitis* on the back of the hand, after-treatment with Gymnastics and Massage has, in a few cases, proved to be of essential use, but in these and all similar cases good-will and much patience, as well on the physician's as on the patient's side, are required if any results are to be attained. These results, however, obviously convinced both myself and several other physicians, that this evidence justifies a belief in a regeneration, produced by the treatment in question, of synovia and synovial membranes, for in no other way can it be explained why mobility returns in such cases where the tendons seem to adhere completely to their synovial sheaths.

The finger-joints.

In *all the finger-joints*, **finger-flexion** and **-extension** can be performed.

In the *metacarpo-phalangeal joints of the fingers* and in the joint between the metacarpal bone of the thumb and the *trapezium*, **radial-** and **ulnar-flexion** (abduction and adduction) and **finger-rolling** can be performed (see also pages 94 and 136).

Medical Gymnastics avails itself of all the movements now given. If it be a general rule that, in attempting to overcome stiffness in a joint, more attention should be paid to gymnastic

movements than Massage, this is especially the case with the finger-joints. As a rule, much unnecessary Massage is given, an insufficient number of movements, because there are so many masseurs who are not at the same time gymnasts and do not know all the possibilities of the movements, and the extreme limits of these, so that they studiously avoid using them. Besides, the treatment of the fingers is extremely tiresome and demands very much time, especially in massage-treatment, hence it can scarcely be expected that a physician will devote his time to it. An excellent movement for the treatment of the finger-joints is

flexion, extension and rolling of the four inner fingers at the same time, but the thumb, on the contrary, requires separate treatment, as has already been explained in the description of the movements.

The treatment of such cases is, for the physician, extremely tiring, and he willingly hands it over to assistants. It not infrequently happens, however, that the physician himself is compelled to perform such treatment which of necessity must cause the patient pain, that is, if the treatment be given with proper strength and if perfectly good results are to be obtained. For my part I consider such a method of procedure to be the only proper one, for the physician is best conscious of and is most responsible for what he does, and he need not pay so much attention to the patient's own wishes as a gymnast must do.

The hip-joint.

In the hip-joint as in the shoulder-joint, *flexion and extension, abduction and adduction, twisting and rolling* can be performed.

Of **hip-joint-flexion and -extension**, several kinds are described on pages 95 and 96.

Of abduction and adduction in the hip-joint, see pages 106 and 112; the commonest movements are **leg-abduction and adduction**.

Leg-twisting and leg-rolling (see pages 125 and 137).

On examining the hip-joint, it should be remembered, that myositis rather frequently occur in the gluteus medius and minimus muscles, neuralgia in n. ischiadicus, and that several bursæ are found in the parts surrounding the joint. *Inflammations* in the hip-joint are rather common and not infrequently of tubercular nature.

To overcome stiffness in the hip-joint is no easy matter; kneadings, hackings and beatings should, in some degree, influence the joint, but, according to my experience, most is likely to be gained by a thorough and persevering leg-rolling. In consequence of the pain, which, in cases of stiffness in the joint, arises in the execution of the movements, the patient often makes much resistance with the many strong muscles surrounding the hip-joint. This resistance the gymnast has much difficulty in overcoming, but best succeeds by continual and repeated commands for the patient either to remain passive or to try to help in the movement, so that this will become active instead, for only by such a method will it be possible to perform the movement. The same will hold good in the treatment of stiffness in other joints.

Myositis + hip joint disease (?) in a boy, 8 years of age, treated 1888—1889.

The boy was in all respects healthy when, in the summer of 1887, he fell on his right hip, which became very tender to the touch and occasioned intense pain on trying to stand on the leg. For several days the patient could not walk on this account, but he gradually improved and seemed to be fully restored. In January 1888, however, he began to limp in walking; the limping increased and the patient had a dragging gait.

When I first observed him, '16/10 1888, several symptoms of the commencement of hip joint disease were found; limping and dragging gait, at times pain, when he was not at rest, and flattening of the right buttock. The mobility in the hip-joint, however, was fairly good in all directions, even if not quite complete. The passive mobility was quite free from pain and of the same extent as in the leg. Further, there was great tenderness to pressure over m. gluteus medius. The diagnosis made by several physicians as hip joint disease was very probable. Gymnastic and massage-treatment was given constantly for 6 months. The myositis disappeared all together, the patient walked better and had no pain in his leg, but the change in form of the hip remained, and also the

limping, so that a note of interrogation after the diagnosis of hip joint disease must also remain. The condition has ever since this time been good, but the hips have not become quite symmetrical and an inconsiderable limp remains.

The case of disease described above constitutes an example of those cases which, according to the previously given description, may be suspected as being tubercular, but where the diagnosis must be looked upon as uncertain. The gymnastic treatment, however, ought to be carefully superintended by a physician.

During the last few years I have had a few patients for after-treatment, on whom complete resection of the joint has been made consequent to hip joint disease.

Stiffness in the hip-joint, resulting from *intra-capsular fractures*, *chronic rheumatism*, *contusion*, and other causes, has in many cases been treated and given perfectly good results. After fracture in the joint and after joint-resections, it is of great importance to properly estimate what degree of mobility in the joint one is justified in attempting to attain.

The knee-joint.

Knee-flexion and **extension** are the only gymnastic movements in the knee-joint. It is true that a little rotation can be performed with the bent knee, but, in treating the joint, this is seldom made use of.

The knee-joint is the largest joint of the body and has a very complicated formation with fibro-cartilages and ligamenta alaria, and is plentifully supplied with bursæ and synovial sheaths in the surrounding parts, in consequence of which it is often the seat of such affections that fall within the range of mechanico-therapy. The knee-joint is, more than any other joint of the extremities, exposed to external injury, and of inflammations in the six large joints of the extremities 40 %

occur in the knee-joint. (In the hip-joint 20 %, and in the other 4 joints together, 40 %.) Fractures and dislocations in the knee-joint, on the contrary, seldom occur.

The general consequence of an injury to the knee-joint, with stretching or sprain of the joint-capsule, will be, that a discharge in the joint will ensue, a so-called *acute serous synovitis*, which manifests itself by pain in the joint, swelling of the same and difficulty in walking. The treatment should, during the first days, consist of rest, ice-bandages and compression with elastic bandages and wadding, but afterwards Massage is of most importance and, by degrees, passive and active movements form the best treatment, and in most cases this leads, quickly and surely, to good results. The discharge in the joint may, however, be chronic, so that an *hydrops genus* arises. In such cases a surgical operation is frequently necessary, such as tapping and washing out of the joint, after which a continued Massage and gymnastic treatment can do much good. It should also be remembered, that tuberculosis is rather common even in the knee-joint. The synovial membrane in the knee-joint is, more than in any other joint, susceptible to destructive processes, by which both the synovial membrane itself and even the joint cartilage can be destroyed.

It is, besides, by no means uncommon, for a long *hydrops genus* to lead to changes of form in the knee-joint, which are called *genu valgum*, *varum* and *recurvatum*.

The method of procedure, for examining whether there be a discharge in the knee-joint or not, has already been mentioned (page 289). In the making of this examination, one must not omit to examine every point of the joint by pressure of the fingers, as frequently the inflammatory part may be somewhat limited. The inner-side of the knee-joint and especially that part corresponding with the position of *ligamentum alare internum*, is often a seat of tenderness to pressure, perhaps mostly because this part is most exposed to blows. Several such cases come annually for treatment. One can be quoted because it shows the importance of a careful examination by means of palpation.

Inflammation in the knee-joint in a man, 22 years old, treated 1887.

On mounting a horse, he had knocked his right knee against the saddle, and, after this, intense pain in the knee and difficulty in walking ensued but with no real swelling or discharge in the joint. The patient was treated almost uninterruptedly with Massage over the knee-joint in its entirety for 2 months' time, and after that a few weeks with blistering, etc., because periostitis was suspected. No improvement ensued.

On examination, I found a tender spot, not quite as large as a three-penny piece, on the place previously mentioned near the ligamentum alare internum. **Massage** was given on this part, **muscle-kneading** on the upper leg and **knee-flexion** and **extension** twice daily during the course of 10 days, when the patient was fully restored, so that he could go up and down stairs and, moreover, walk as well as before the occurrence of the injury.

Vasomotor joint-neurosis occurs, according to medical statistics, more frequently in the knee-joint than in any other. One case, that was treated under this diagnosis, can be quoted, as it is of special interest in that it afterwards showed that the patient had tuberculosis, so that the knee-joint-inflammation must be considered as being of a tubercular nature. Besides, no reasonable explanation has as yet been given for these joint-neuroses, but in most cases here as in other neuroses, some real disease lies at the root, although it is not easy to discover.

Intermittent vasomotor joint-neurosis in a girl, 16 years old, treated 1887.

Discharge in the knee-joint occurred at times, and remained some weeks, so that the patient was obliged to be confined to bed, after which improvement gradually ensued. The synovial fluid was tapped several times, but appeared again very quickly afterwards. In the year 1887 Massage was given on the knee-joint for 4 months, muscle-kneadings and circulatory-furthering movements, which all improved the condition for a few months. A change for the worse, however, again took place, and it

was proved that the patient had tuberculosis, from which she died one year later.

That movements, under certain conditions, can help to *diminish an abnormally increased mobility*, has already been said. Several such cases have been observed; most frequently it has concerned the knee- and foot-joints in rachitic children. One case may be quoted, in which an incorrectly given treatment would unquestionably have been the cause of a change for the worse in the condition, as a movement was given that does not exist in the joint in question, when normal.

Abnormally increased mobility in the right knee-joint, in a boy, 4 years old, treated 1892.

The boy had been rachitic from his earliest infancy. After an operation for osteomyelitis in the os ilium on the right side had been performed early in 1892, he had been in bed several weeks with the right leg bandaged. In consequence of this, the boy's general condition had become worse, and the right leg especially had become weaker than the left. Generally strengthening Gymnastics was prescribed and performed by a female gymnast who, stupidly enough, amongst other movements, gave him "*rollings*" in the right knee-joint. This movement progressed really well, as an abduction and adduction of about 30° could be performed in the knee-joint on the leg being stretched.

After this movement had been exchanged for a proper **knee-flexion** and **extension** and **muscle-kneading** on the leg, the condition was improved, so that, after 4 months' treatment, the abnormal mobility in the joint had disappeared, at the same time that the general condition was improved.

Genu valgum, knock-knee, is successfully treated in young people with orthopedic apparatus; a bandage¹ at night is, in most cases, sufficient. In full-grown and severe deformities an operation may be necessary.

¹ Ortopedisk bandagebehandling af A. Wide. Stockholm 1892.

The use of orthopedic apparatus does not exclude the simultaneous use of Gymnastics, and with both together the best result will be gained in the shortest time. Such a treatment is frequently necessary for young boys who intend to be officers. But orthopedic apparatus are to some people as forbidding as operations, so that in some cases Gymnastics alone must be used. Such was the circumstance in the following case. Outside Sweden the beneficial influence of Gymnastics for knock-knee is scarcely known.

Double-sided knock-knee in a boy, 9 years old, treated 1891—1893.

The patient, during his earliest years, suffered from digestive trouble and became scrofulous and rachitic, as were most of his family, but was otherwise well-grown and stoutly built. As it was already decided that he should devote himself to a military career, it became necessary to arrest the existing deformities in the osseous system. Amongst the most prominent was knock-knee. The upper and lower leg on the right side formed an outward open angle of 173° and on the left side 172° . To stand with the legs stretched and in all their length close to each other was impossible, but one knee had to be kept in front of the other, if the heels touched each other. If he stood with fully stretched legs and the upper legs close together, the heels were about 20 ctm. from each other.

Besides knock-knee, he had also so-called "*turned-in feet*," a deformity, that often accompanies knock-knee and can occur without there being flat-foot at the same time.

A gymnastic treatment was given for about 4 months yearly 1891—1893, when the legs were of perfectly normal form and had strong muscles.

The movements used for knock-knee are **double leg-abduction** and **adduction** with resistance placed on the lower leg above the outer malleolus, and **knee-flexion** and **extension** and with resistance on the inner side of the knee and outside of the lower leg as well during flexion as during extension.

In *rachitic crooked lower leg*, muscle-kneadings and manual redressions, commenced early and often repeated, will make

orthopedic apparatus unnecessary otherwise than in such cases where the deformity is great.

Fractures to the lower leg form, according to *Gurlt*, 16.5 % of all the fractures and are thus the commonest next to fractures of the forearm. Although the so-called "ambulant" method of treatment of the simple lower leg fractures are now probably the commonest, a firm and sure fixation is, however, necessary here for a longer time than in the treatment of fractures of the forearm, but the principle of the treatment is the same, that is, not to let the fixing bandage be on longer than is necessary and to commence with the movement-treatment as early as possible. In this way the patient will have good functional capacity in the limb as soon as the union is completed.

The ankle-joint.

The gymnastic movements in the ankle-joint are:

Foot-flexion and -extension ;

Foot-twisting inward and outward ; and

Foot-rolling.

Total dislocations in the ankle-joint but very rarely occur and even subluxations are rare. On the other hand, as has already been mentioned, fractures of the lower leg occur pretty frequently, as do also *distorsions* or *sprains* in the ankle-joint. The last-mentioned complaints often cause stiffness in the ankle-joint, if they be not treated in time, and they give the gymnast much labour. Fluctuation in the ankle-joint is not easy to observe by means of palpation, if any great quantity of discharge does not exist. On account of the formation of the synovial membrane a discharge in the ankle-joint is best observed in front of both the malleoli, especially in front of

the outer malleolus. Often the parasyovial tissue is swollen, for example, after severe distortions, when not only the parts mentioned are swollen, but also the front of the foot and the vicinity of the tendon Achilles.

In a less considerable sprain of the ankle a light but long continuous effleurage and passive foot-rolling may at once be given; if the swelling be great, or if there be any fear of a rupture of the ligaments, a few hours' rest with an ice-bandage on the foot-joint is to be advised, but as soon as the swelling is no longer on the increase, the massage-treatment is given; in addition to this, the ice-bandage is still continued, or one can proceed to compression of the swollen parts with elastic bandages and wadding. Passive foot-movements further circulation and support the effect of the massage; they should, therefore, be early included in the treatment, especially as they prevent the occurrence of stiffness in the joint more than does the Massage. If the patient can well tolerate passive movements, he can also be allowed to use his foot.

In several cases, when the treatment has been performed in this manner, it has happened that patients who have sprained their ankle-joint, have been able to use the foot and even walk the very same day of, or the day after the occurrence of the injury. In every similar case, however, the existence of malleolar fracture should be positively excluded. I mention this, because I have seen mistakes made, so that a pretty strong Massage has been given on quite fresh fractures that have been mistaken for distortions.

The treatment of effusion in the foot-joint or swelling in the vicinity of the joint ought, in every case, to continue at once, until the patient is fully restored to health, for if the complaint has once been allowed to become chronic, it is not only very difficult to cure, but also quite an inconsiderable swelling in the ankle-joint occasions the patient considerable inconvenience.

In *the joints between the footbones, synovitis* is far from rare. I have every year had some cases of *flat-foot* for treat-

ment, where discharge in these joints has been pretty considerable and caused the patient great pain. Particularly in the joints between the talus and os naviculare and between the os naviculare and os cuneiforme, primum, the discharge may be so considerable that it is easily palpable, and the bones mentioned will be easily movable relatively to each other. Objective symptoms are often wanting, but the pains can, however, be extremely severe.

Tubercular inflammation also occurs in the tarsus and is sometimes primary in one of the bones of the foot, sometimes in the joints, a circumstance I have wished to point out, so that the serous synovitis may not be mistaken for it. The following case, which was treated at the Gymnastic Orthopedic Institute by Doctor *Benedictsen*, is very instructive.

Double-sided flat-foot with synovitis in the tarsal joints in a man, 24 years old, treated 1891—1892.

The man was a Swede by birth, but had lived in Australia for many years, where, amongst other things, he had worked as a shepherd and wool-washer and, consequently, stood and walked much. He continued with this, although his feet at last became so tender, that it was only with extreme difficulty he could drag himself along; he had severe ache in his feet and legs, right up to the hips. At last he was admitted to the Infirmary in Melbourne and had to lie there 4 months, without any essential improvement ensuing; but when the patient, on account of the considerable swelling and the intense tenderness in the feet, was supposed to have osteomyelitis in the bone of the foot, incisions were made at several spots. He finally came home to Sweden. On his consulting me, 17/10 1891, I advised him to seek entrance to the surgical clinique in order to have his feet redressed and put in plaster bandages under chloroform. At the hospital, however, they thought that massage-treatment ought to be given first, so that the very considerable discharges in the tarsal-joints might, in some degree, be lessened.

So the patient first had Massage and redressing movements for 2 months' time, from which his condition was somewhat improved, the discharges in the joints especially were essentially diminished; after this he had a plaster bandage for 6 weeks, with change of bandage after 3 weeks, by which he was still more improved so that he could walk without any trouble; finally, a few weeks' more massage- and gymnastic

treatment was given, besides which he used flat-foot shoes with steel-plates for the raising of the foot-arch and supporting-plates on the insides of the shoes.

A time of nearly 5 months had been spent on the treatment of the case described above, but then it was an unusually difficult one. Generally, a plaster bandage for 2 to 3 weeks and afterwards flat-foot shoes is sufficient; or Massage and gymnastic treatment for a couple of weeks and the use of flat-foot-shoes from the very commencement of the treatment, with which, in most cases, as good results are gained. The latter treatment is the better in this way, that the patient need not be kept from his work, but it certainly requires more trouble on the part of the physician.

The gymnastic movement that best redresses flat-foot, is **foot-twisting inward**, described on page 125.

For *club-foot*, on the contrary, **foot-twisting outward** is used (see page 125), and in some slight congenital cases the results are that the child can tread on the sole by the time it begins to go to school.

As regards further treatment of deformities of the foot I refer the reader to my previously published work: *Orthopedisk bandage-behandling*.

The toe-joints.

The movements that can be performed are:

Toe-flexion and **-extension** and **toe-rolling**; these movements can advantageously be given simultaneously in all joints, analogously to the corresponding finger-movements. Foot- and toe-movements are in many cases necessary in paralysees with accompanying deformities, which they can check, or at least prevent from developing too much.

The treatment of *podagra* has already been mentioned on page 284.

The joint of the lower jaw. The temporo-maxillary articulation, can seem to be not very accessible to Massage and movement-treatment, but such treatment, however, pretty frequently occurs and, in most cases, does good. I have previously published an article on this.¹ Several movements can be performed on the joint of the lower jaw.

The lower jaw can be carried forward and backward, downward and upward, to the sides, and a considerable circumduction can also be performed. In diminished mobility in the joint all these movements ought to be used. If it be difficult for the patient to perform the movements actively, the gymnast can perform them passively if, from in front, he take hold, with both hands, of the lower jaw in such a manner, that the thumbs are placed inside the patient's mouth and firmly laid on the teeth of the lower jaw on both sides, while the fingers hold the jaw fast from outside. I should perhaps add, that the hands, in these manipulations, should be covered with a clean towel. During the treatment the patient's head is fixed by an assistant, or else the gymnast holds the patient's head with the one hand and performs the movements with the other. The Massage is applied to the outside of the jaw-joints, while the lower jaw hangs down loosely.

A slight subluxation of the lower jaw is rather a common complaint. It manifests itself by a cracking or snapping in the joint in chewing, and especially if the mouth be opened more than usual, as for example, in yawning. It then often happens that the jaw appears to come out of joint on the one side or the other, so that it becomes necessary to put it back with the hand. I have observed a few such cases. A fellow-student could at any time "crack" with his jaw-joints, so that

¹ Massagebehandling vid affektioner i käkleden, af S. Wallgren och A. Wide, Tidskrift i gymnastik. Bd. III, s. 389.

a report was distinctly heard. If the fingers, during the time, were firmly pressed against the jaw-joint, a strange crepitation and clacking could be felt in the joint. Dislocation in the jaw-joint he had never had.

Of subluxation in the joint of the lower jaw I have treated several cases, two female members of the same family, 1882.

They were troubled with the above-described symptoms, especially in chewing of solid food, in yawning, hearty laughter, etc. They had not gone through any illness that could have caused the subluxation and they had no abnormal mobility in the jaw-joints. I treated them for a little over a month and both the patients seemed to be much better. I do not know if this improvement have continued, but as they both learned to give themselves Massage on their jaw-joints, it is probable, that they have still had use of the same.

Joint-neurosis in the jaw-joint is not rare; I have treated a few cases of it.

Chronic rheumatism and arthritis deformans frequently occasion changes in the jaw-joints. One case of chronic rheumatism, probably caused by gonorrhœa, with stiffness in both the jaw-joints, approaching ankylosis, was treated successfully by Doctor *Astley Levin*. This case, as also a case of joint-neurosis, is mentioned in the article quoted on page 311.

SPINAL CURVATURES

Spinal curvatures are reasonably included amongst the more serious of the acquired deformities that occur in the growing generation, because they so frequently leave unpleasant consequences for the whole life. It is therefore of great importance that they be discovered and suitably treated as early as possible, and a spinal curvature will easily be detected by every physician, if he only take the trouble to look at the naked backs of children.

The spine of a new-born babe is almost straight, but from the time the child begins to walk erect, curvatures arise in the direction forward and backward which are normal and physiological, viz. a curvature with the convexity forward in the region of the neck, backward in the dorsal region and forward in the lumbar region. In weakness of the osseous system an abnormal increase of one or several of these curvatures easily takes place. An increase of the curvature backward is termed *round-back*, *kyphosis arcuata*; increase of the curvature forward, *saddle-back*, *lordosis*. That no misunderstanding may arise, I consider it best at once particularly to point out that the *round-back* which is here mentioned, and which is amenable to gymnastic treatment, does not arise from an inflammation in the spine, so that it must be clearly distinguished from *hump-back*, *kyphosis angularis*, or *spondylitis*, which always results from, or is a consequence of a previous inflammation in

the spine, even in such cases where the hump does not project backward, but is combined with a lateral curvature of the spine.

Every permanent deviation to the side in the spine is called *lateral curvature* or *scoliosis*, and is the form most commonly occurring of all deformities of the spine. There are several different forms of scoliosis, as the curvature may include only a few vertebræ, or the spine in its entirety, and, besides, two or more curvatures can simultaneously be found in the same person. Scoliosis may be called *cervical*-, *dorsal*-, or *lumbar-scoliosis*, depending upon which part of the back is bent. Scoliosis can further be right-sided or left-sided, according to the convexity of the lateral curvature. The lateral curvatures of the spine are of so frequent occurrence, that some authors have considered a slight lateral curvature to be physiological, quite as the curvatures in the direction forward and backward. This, however, is not the case.

To enter into a detailed account of the pathological changes in the osseous system which attend the development of scoliosis, does not really lie within the range of a hand-book in Medical Gymnastics; the many theories for the causes of the origin of scoliosis must also be treated of very briefly, but a little on all of this must, however, be said, so that a correct idea of what scoliosis is, may be obtained. I refer those interested in this to *Lorenz*' work,¹ which, as regards the arrangement of the pathological anatomy of scoliosis, I have partly followed.

Scoliosis has a pretty constant course. Although no exact limit can be fixed, scoliosis may be suitably divided, from a symptomatological point of view, into three degrees of development. The slightest forms of scoliosis can pass over into the most severe, but it is, however, in every case, impossible to foretell whether a scoliosis will be stationary at a certain stage or whether it will further develop itself.

¹ Pathologie und Therapie der seitlichen Rückgrat-Verkrümmungen (Scoliosis). *Adolf Lorenz*. Wien 1886.

A *scoliosis of the first degree* may, to the unpractised, be difficult to detect, as no fully clear curvature of the spine itself can be observed, the line that unites processus spinosi being quite straight, but the existence of the scoliosis is then characterized, even if very slightly, by a forward-arching or bulging-out of the lateral contour in the region of the chest. Thus an



FIG. 86.

habitual scoliotic bodily bearing exists, although the change attending this in the spine is not always so noticeable. This scoliotic bearing exists, wherever the patient takes a standing or sitting position, but it disappears in a hanging or lying position, which particularly characterizes a scoliosis of the first degree.

A scoliosis of the second degree can also disappear, as long as the patient takes certain positions or performs certain

movements which counteract the form of scoliosis in question; pressure on the convexity of the curvature may also bring the spine back to a straight position. The last-mentioned circumstances are of somewhat great importance in the treatment of the scoliosis. A scoliosis of the first degree is called *simple*, *primary* or *C-formed*, by which is signified the curvature in which the line of processus spinosi has first deviated from the sagittal plane of the spine. Generally the primary scoliosis appears as right-convex dorsal-scoliosis (Fig. 86), or as left-convex lumbar-scoliosis (Fig. 88), but the opposite conditions can also exist, although more seldom.

A *scoliosis of the second degree* arises in this manner, that to the primary curvature, after a time, another unites itself—a *secondary*, a *compensatory* or so-called *anti-curvature*; in consequence of this formation, the scoliosis has become *S-formed* (Fig. 87). A scoliosis of the second degree differs from one of the first degree also in that the curvature now does not quite disappear in a hanging or lying position, nor always in taking certain bodily-positions, nor by means of pressure on the convexity of the curvature, but the spine is, however, still mobile, so that the curvature, in the given positions, is diminished, in consequence of which the scoliosis can be treated successfully also in this stage. The horizontal rotation that the vertebræ of the spinal column undergo is also characteristic of this stage, of which more below.

Often several compensatory curvatures are formed, so that in one and the same patient a *left cervical* or *dorso-cervical scoliosis*, a *right dorsal*, a *left lumbo-dorsal* or *lumbar*, a *right lumbar* or *sacro-lumbar* can be found.

The *third degree* of development in scoliosis, is arrived at by the formation of several deformities of the spine itself and of the adjacent bones, whereby the scoliosis becomes *permanent* or *fixed*, so that the curvature of the spine itself in this stage cannot be treated. The attendant symptoms of shortness of breath, disordered circulation and intercostal neuralgia must, on the other hand, often be treated. The scoliosis in this degree is called *kypho-scoliosis*. A *kypho-scoliosis* can

arise both out of the C-formed and of the S-formed scoliosis.

When a scoliosis develops itself, the *vertebræ* undergo a most radical change, from a purely pathological point of view, and this change is not easy to detect, but the alterations in the ribs, with respect both to form and position, is the surest



FIG. 87.

symptom from a purely clinical point of view. Through the uneven pressure to which the *vertebræ* are exposed in a scoliotic spine, the side directed towards the concavity of the curvature will be slower in growth, while the side directed toward the convexity will develop itself normally. The consequence of different development will be, that the *vertebra* will gradually assume the form of a wedge, with the point of the wedge directed toward the concave side of the scoliosis. If several

curvatures simultaneously exist in a spine, similar circumstances will appear in every special curvature. Such an asymmetry of the vertebræ, arisen in consequence of the checked development, just serves, together with the rotation of the vertebræ, to make the spinal curvature worse and cause the great deformity of the chest.

By *rotation* or *torsion* of the spine we see that the line which may be supposed to unite the anterior surface of the bodies of the vertebræ, in side-flexion, forms a greater curve than the line which unites the spinous processes. Opinions have differed much on this question, which is, however, of the greatest importance in forming a correct idea of the development of the scoliosis, viz., whether each side-flexion of the spine is attended with a rotation or not. An observation made in Swedish Gymnastics deserves mentioning here, namely, that in side-flexion of the spine a twisting can also easily occur. To one who is unaccustomed to employing Gymnastics, this so manifests itself, that the shoulder of the same side is twisted forward, which is always corrected as a mistake, if a side-flexion is to be made perfectly. The real object of the body of the vertebræ is of course to support the trunk, of the lamina to enclose and protect the spinal cord, at the same time that their articular and ligamental apparatus are so ordered that the movements in the spine have a suitable limit. That a slight degree of rotation is included in every side-flexion of the spine, is stated amongst others by *Dittel*, who declares the rotation to depend upon the different build of the anterior and posterior parts of the spine. In front the vertebral bodies lie separated by the somewhat thick inter-vertebral discs, kept together by the anterior and posterior common ligaments (which are not especially strong), besides which the vertebræ only in the cervical and lumbar region serve as attachment for the muscles; behind the laminae, on the other hand, they lie with their spinous, transverse and articular processes united by rather strong ligaments and several muscles, which are among the strongest in the human body. A pillar, composed of so many different parts, can not possibly perform a pure side-flexion if the spinal

muscles do not regulate the movement, but in the side-flexion there can only be a slight degree of twisting, so that the row of the vertebral bodies describes a somewhat larger arch than the row of vertebral laminae. What here holds good for the simple side-flexion, does so also for the double flexion, so that here too the rotation is double; the vertebral bodies will be directed toward the convexity, the laminae toward the concavity in each curvature. An incipient scoliosis, can thus arise by the spine being held in a stooping position too long at a time, or by such a position being frequently assumed that the mobility in the joints of the spine on the convex side will, to some degree, be restricted. A correspondence is found in the other joints of the body; that is, if a joint be held for some time in flexion-position, a shortening of the soft parts on the side of flexion will ensue, together with a stretching on the side of extension, and diminished mobility in the last-mentioned direction. The purely pathological-anatomical conditions during the first stage of development of the scoliosis are at present far from clear. So much is, however, certain, that in an incipient scoliosis the changes lie exclusively in the intervertebral discs and not in the vertebrae themselves, but as soon as the scoliosis is somewhat more considerable, the vertebral bodies also take part in the process. A scoliosis thus originates from the flexion of the spine and torsion of the vertebrae.

The wedge-shape is mostly developed in the vertebrae which form the greatest deviation of the spine, the so-called *points of maximum*, and decrease upward and downward toward the *points of interference*, that is, those points where the one curvature passes in to another.

If the change of the vertebral body be considerable, the *laminae* will also be changed, so that in its separate parts the vertebra will atrophy to the same side as that toward which the wedge is directed, that is, to the concave side of the scoliosis. The spinal foramen gradually loses its rounded form and takes a more elliptical form. It is generally said that the points of the spinous process in a scoliotic spine are directed toward the concavity of the curvature, but their direction is in reality so

inconstant both in the normal and scoliotic spine, that nothing can be concluded therefrom.

In the osseous tissue of the vertebræ a condition arises, through pressure, of so-called *irritative new-formation*, which is most clearly marked at the point of the wedge; an increase of the osseous substance arises through this, so that several vertebræ are firmly united in one single osseous mass, in outward appearance resembling that which arises in the healing of a spondylitis.

As the spine forms the basal column of the whole trunk, its deformity reacts on all those bones that stand in relation with the same. It has already been said that from a clinical point of view the greatest change is to be found in the *ribs*, so that an incipient scoliosis is most easily detected in the change the chest undergoes in its entirety. The special alterations in the ribs, so to say, accompany those of the vertebræ; so, for example, those ribs that correspond to the convexity of the scoliosis will be separated from each other; those that correspond to the concavity will, on the contrary, become compressed and even atrophic. Further, the ribs on the convex side will develop a considerably increased flexion of their posterior extremity, and diminished flexion, on the other hand, of their anterior extremity; the opposite will be the case with the ribs on the side that forms the concavity of the spinal curvature. In a right convex dorsal-scoliosis, an incipient change of the ribs is primarily seen in that the posterior angles lift themselves above the surrounding level, and in a slight bulging-out of the right side-contour of the chest. From the change of form in the ribs, that of the vertebræ, can, to a certain extent, be accounted for; if a lateral hump be formed, the vertebral bodies will certainly already have taken the wedge-form; this can be assumed from observation of the skeleton. In the Gymnastic Orthopedic Institute Collection there is a skeleton, where the hump is inconsiderable, but where the vertebræ, however, are of a well-defined wedge-form. I have made these observations because they might be of importance in the formation of a prognosis for the treatment.

In consequence of the change the ribs undergo, *a change of the chest in its entirety* takes place; that half of the chest on the convex side of the scoliosis will be diminished in all its dimensions, the half of the chest on the concave side will, on the contrary, be enlarged. All the diameters of the chest will be changed, the diagonal most clearly. If the same example as before be taken, namely right-convex dorsal scoliosis, the right diagonal diameter, that is, the one that goes from behind forward and from right to left, is considerably enlarged, the left diagonal diameter considerably diminished. A horizontal section of a scoliotic chest shows therefore an irregular, elliptical form, whose greatest axis, in the above-mentioned case, is formed by the right diagonal diameter; the chest has a so-called *posterior hump* on the right side, an *anterior hump* on the left. If two curvatures exist in the dorsal region of the spine, two corresponding thoracic deformities will also arise.

A *change of position* of the *sternum* does not so frequently occur, but I have, in the above-named form of scoliosis, in some cases seen the lower end of the sternum deviate toward the left, i. e. toward the concavity of the curvature.

In a well marked scoliosis the *pelvis* will, in consequence of the uneven weighting, also be crooked and asymmetrical, especially in more severe lumbar scoliosis, as then the os sacrum also takes part in the spinal curvature. In left-convex lumbar scoliosis the diagonal diameter of the entrance to the pelvis going from the left and posteriorly, obliquely forward to the right, will be enlarged and the right one diminished; being thus quite the opposite to the diameters in the chest. *Lorenz* remarks that such curvatures of the spine do not belong to the "orthopedic scoliosis," i.e., such as are not amenable to treatment.

Nicoladoni has proved that even the *ligamentous apparatus of the vertebrae of the spine and ribs* take part in the change that the skeleton itself undergoes. The anterior common ligament will be asymmetrical, so that the greater part of it will form a thick edge on the concave side of the curvature, while

the ligament is thinned to the convex side. The intervertebral discs, like the vertebræ, take the wedge-form, with the point of the wedge directed to the concavity of the curvature. The intervertebral discs will be, moreover, in well-marked scoliosis, so atrophied that the vertebræ will touch each other and form the above-mentioned fusion. By the intervertebral discs taking the wedge-form, their gelatinous nucleus is pushed toward the convexity of the curvature. Even the ligaments of the joints will be changed. That all these changes help to form an uneven weighting of the spine and to increase the scoliosis, is, naturally, only a matter of course.

As regards the *muscles of the spine*, the change in the same, as the reader perhaps knows, was formerly considered to be very considerable, and it has even been considered as being the origin of the scoliosis. In well marked scoliosis the long dorsal muscles that run over the convexity of the curvature become stretched and even atrophic, perhaps mostly in consequence of the rigidity of the spine and the consequent inactivity of the muscles.

The *shoulder-blade* is removed from its normal position by the change in the chest. The shoulder-blade on the convex side is pushed forward by the increased posterior bulging-out of the ribs in the direction upward, backward and outward from the middle line; the shoulder-blade on the concave side sinks, on the contrary, because the ribs on this side will be less curved posteriorly and the shoulder-blade draws nearer, at the same time, to the middle line. In a right-convex dorsal scoliosis without very considerable compensatory curvature in the cervical region, the right shoulder-blade is higher than the left (see Fig. 86). If, on the other hand, there be any considerable left-convex dorso-cervical scoliosis developed, the left shoulder-blade is higher than the right.

Habitual scoliosis.

Amongst scoliosis theories, the *myopathic theories* have played an important rôle.

Eulenburg is one of the principal adherents of the muscle-theories; he starts from this stand-point:—that the activity of the muscles is necessary to the retention of the spine in an erect position, in consequence of which, therefore, the primary cause for the scoliosis must be sought in an abnormal function of the muscles influencing the spine. A scoliosis originates therefore, whenever, from one or other cause, the antagonism between the muscles on either side of the spine becomes disturbed. A disturbed antagonism is best observable in one-sided trunk-muscle paralysis; the scoliosis, under such circumstances, produces a *convexity to that side where the muscles are paralyzed*, but scoliosis from this cause is, however, not so very common. On the other hand, just the habitual one-sided use of the muscles of the spine is considered to be one of the commonest causes of scoliosis, so that a physiological side-flexion, when it is often repeated or continues long at a time, gradually causes the abnormality that is called *habitual scoliosis*. A disposition to scoliosis is, from this cause, rather wide-spread, and it principally occurs in young people and quite independently of social position, as soon as two moments meet, viz., *a pre-disposition through the general feebleness of the system or bad nutrition, and a continuous, intentional or unintentional assumption of a bodily position lending to a side-flexion of the spine.*

Such a one-sided bearing arises in the ordinary incorrect *writing-position*, when the right arm is conducted somewhat far out from the right side, while the left upper arm is kept close to the left side of the trunk, which, in the writing-position, is, at the same time, also kept bent with the concavity toward the left. Nearly the same position is taken in a number of different kinds of work, especially in so-called female handiwork. Habitual scoliosis occurs also much oftener in girls than in boys: in about the proportion 10:1. I have had occasion to observe that right-convex dorsal scoliosis has arisen in four girls of the same family, because, at a very early age, they had commenced to make sails and sacks, work that, in relation to their development and strength, was far too hard

and, besides, one-sided. In one of these girls scoliosis developed into spondylitis.

How now does scoliosis originate from such one-sided work? Some authors presume that those muscles which indirectly, by means of the scapula and clavícula, fix the working arm to the spine, should, by drawing the spine to their side, cause the scoliosis, but such is, however, not the case. The direct cause of the origin of the scoliosis must be sought in the desire to fix the yielding spine and in this way give the muscles named a fast point of attack; and this they obtain, if the muscles on the opposite side contract themselves. If we begin with the assumption that the right arm, as is generally the case, is used in working, then, whenever this arm lifts a weight or is kept raised and performs work, the muscles on the left side of the spine will be put into a state of contraction, in consequence of which the spine will gradually be carried over to the right, so that an *right-convex dorsal scoliosis* ensues. The scoliosis is pathological, when the muscles on the right side of the spine, by means of their contraction can no longer re-conduct the spine to an erect position, so that the spine also ceases to be quite mobile and the muscles on the side of the convex curvature gradually become atrophic and stretched. *Dittel* says, that these changes in the muscles are secondary, i. e. they depend upon inactivity and atrophy on account of the rigidity which has arisen in the spine, for the changes are observed only in old, well marked scoliosis.

Lorenz points out, that the difference between the myopathic and the static theories is in reality not particularly great.

Amongst the partizans of older muscle theories two may be briefly mentioned, although they have already been confuted.

Guerin assumed that the muscles on the concave side of the spine were put into a permanent state of contraction.

Malgaigne's theory was based on a stretching of the ligaments on the convex side of the curvature, which arose as soon

as the muscles were too weak to keep the spine in an erect position.

The scoliosis theory advanced by *Hueter* is based in the assumption of an asymmetrical growth of the chest and spine. A scoliosis, according to *Hueter*, is always primary in the dorsal region, because it is really a consequence of an asymmetrical development of the ribs; in consequence of different pressures on the two lateral halves of the vertebræ the growths will afterwards be different, so that the half supporting the greatest pressure will grow less. *Hueter's* theory, which is also called the theory of development, is now confuted.

According to *Lorinser*, scoliosis arises through an insidious, slowly progressing inflammation in the vertebræ, thus really the same process as in spondylitis. Undeniably there is much that speaks for this, although it is extremely difficult to prove.

Sabatier was the one who first advanced the above-mentioned theory of a physiological curvature with the convexity to the right in the dorsal region, and that scoliosis arises in consequence of an increase of this physiological curvature.

Static scoliosis.

If a shortening of one of the legs or one half of the pelvis exists, a scoliosis in the lumbar region, with the convexity to the same side, will arise. The causes for such a shortening are many, such as arrested development, infantile spinal paralysis, fractures with shortening in the course of healing, bone inflammations, inflammations in hip- or knee-joints with attendant cramp-contractions, congenital hip-dislocations, knock-knees, etc.

The difference of length between the two halves of the body is often enough quite inconsiderable, 1 ctm. or even less, so that it can with difficulty be measured, but the static dispositions arising from it may, however, through a constantly growing influence, be the origin of a typical lumbar scoliosis.

A scoliosis begins almost as frequently in the lumbar region as in the dorsal region; the primary curvature then originates between the first and third lumbar vertebræ and has nearly a constant convexity to the left. The commonest cause attributed to lumbar scoliosis is:—*the great inclination in children to stand principally on one leg in taking the standing position, and, in the sitting body-position, they let the weight of the body chiefly rest on one buttock*, so that the line of weight does not fall exactly between the two tubera ischii.

In resting or standing on one leg, a sinking ensues of the pelvis to the unsupported side, from which, of necessity, a physiological lateral flexion takes place in the lumbar region with the convexity to that side. Weakly developed persons often take such a position, and the natural consequence of this is, that the physiological flexion-curvature, when often repeated, passes over to a pathological one. As the right leg or right half of the pelvis most frequently bears the weight of the body, the consequence is, that a *left-convex lumbar scoliosis* (Fig. 88) is the most common. That girls much like to take such a position of "hanging on the right leg," I have often had occasion to observe in examination of school-girls. The static scoliosis is also, according to concordant statements, more common in girls than in boys.

In some patients it will be observed how the lower part of the trunk is kept carried over to one side, generally to the left, by which an incorrect bearing results, certainly a very inconsiderable one, but still so great that the left hip seems lowered and the right hip protuberant. But the sinking is only apparent, for the above-mentioned condition can exist without the slightest shortening of the left leg or of the left half of the pelvis being observable if measurements be taken when the patient is in a lying position. A correction of this incorrect bearing is necessary, because the lumbar region of the spine is in any case kept in a slight arch to the left and from this incorrect bearing a left-convex lumbar scoliosis can arise. To the static scolioses belong also the *hemiplegic total*

scolioses. If the paralysis be not considerable, *the scoliosis has its convexity to the diseased side*, but in well marked paralysis the patient is compelled—in order to hold the trunk upright—to carry the greater part of the weight of the body over to the non-paralysed side, in consequence of which a *scoliosis with the convexity to the healthy side can also arise.*



FIG. 88.

In *sciatic scoliosis* the trunk, according to *Kocher*, is carried over to the diseased side to protect the morbidly attacked nerves, which occurs if the muscles on this side be kept in passive tension by means of the contraction of the counteracting muscles, so that also a *scoliosis with the convexity to the diseased side* arises. Not infrequently the opposite may be the case.

Rachitic scoliosis.

Amongst the deformities of different parts of the skeleton in rachitic children spinal curvatures are, perhaps, the most severe, because they almost, so to say, defy all treatment. As the sustaining power of those vertebræ, attacked by the rachitic process, is very slight, the spinal curvatures generally arise in that period of development when the child begins to take an upright position with the trunk; according to *Eulenburg's* statistics, rachitic scoliosis arises at the rate of over 50 % during the second year of life, about 25 % during the third, 12 % during the first and from the fourth year a gradual decrease down to the sixth year.

Rachitic scoliosis is generally explained as arising in this manner, that the yielding spine is far too often allowed to take a crooked bodily bearing, either while continually sitting-up in bed, or while the nurse carries the child in her arms. Left-convex rachitic scoliosis is more general than right-convex and is said to depend on the child's being principally carried on the left arm, which is often really the case, as the nurse requires the right arm free to attend to other business.

Both the form and direction of rachitic scoliosis are of diagnostic importance. In habitual scoliosis the primary curvature lies either in the dorsal or in the lumbar region. In rachitic scoliosis the maximum point of the primary curvature is in the middle of the entire vertebral column and is generally convex to the left, thus a *left-convex lumbo-dorsal scoliosis*. This curvature commonly forms a very large arch, as it includes the greater part of the spine and it is nearly always compensated by a right-convex dorso-cervical scoliosis and a right-convex lumbo-sacral scoliosis, in very short but sharp curves. *Lorenz* says, that "just as a staff overweighted on top in the direction of its perpendicular axis, first bends in the middle, so in the rachitic spine, in consequence of the disproportion between the overweighting and the sustaining capacity, the arch-formed kyphosis sometimes arises, and sometimes the scoliotic side-curvature, with the maximum point of the curva-

ture corresponding with the middle of the vertebral column." So, more than in other scolioses, the rachitic scoliosis, in its development, follows the law of gravitation, and such a scoliosis often reaches a greater and greater degree of development, corresponding to the development of the body in general.

The diagnosing of a rachitic scoliosis is made easier by the presence of other rachitic deformities in the skeleton, such as crooked lower leg, swelling of the epiphysis and the sternal extremity of the ribs, etc.

The changes of the chest generally appear in the form of so-called pectus anserinus or pigeon breast, a bulging-out or sinking-in in front of the one half of the chest, a sinking-in or sharp bulging-out of the sternum and, finally, a considerable and sharp posterior curvature of the ribs on the convex side, so that an actual rib-hump, or gibbus, forms itself. As the skeleton in rachitic subjects is particularly soft and yielding and the deformities appear in very early years, they develop very rapidly, become at the same time well marked and soon fixed, in consequence of which, therefore, the treatment should be commenced at an early date and all effective remedies be had recourse to at the same time, if any results are to be attained.

Rachitic scoliosis appears as often in boys as in girls.

Traumatic scoliosis arises in every case where the vertebræ meet with any external injury which is strong enough to fracture or dislocate them. A scoliosis may result through other parts of the body in relation with the vertebræ, being injured. The scoliotic bending of the spine forms itself in these cases; both directly—anyone injured tries of course to take the position that causes him least pain—and indirectly in consequence of cicatrization, adhesions, etc.

Congenital anomalies in respect to number and form existing in the vertebral bodies themselves, now and then occasion scoliosis; more seldom also morbid growths in the proximity

of the spine, pathological changes in adjacent organs, for example, cardiac hypertrophy, etc.

Amongst *acquired changes in the form of the chest* and the accompanying scoliosis, pleurisy with effusion must be especially named as a cause. If the exudate be rather considerable, if it remain any length of time and, in particular, if it turn into pyothorax, then, through the shrinking of the lungs, a sinking together of the diseased half of the chest will result and, as a consequence thereof, *a scoliosis in the dorsal region with the convexity to the healthy side.*

A more uncommon cause of scoliosis is rheumatismus muscularis. The patient feels a lively pain in the muscles attacked with rheumatism, so that in every way he tries to put these muscles into a state of inactivity, and this succeeds best when the muscles counteracting those attacked are constantly kept in a state of contraction. The consequence of this will be *a scoliosis with the convexity to the diseased side.* The muscles of the neck are attacked somewhat frequently by rheumatism, as possibly are also the joints of the cervical vertebræ, and as the vertebræ in the cervical region are easily moved in relation to each other, a considerable cervical scoliosis will soon appear, a so-called *rheumatic torticollis*, which is compensated by a dorsal scoliosis, so that the head can be kept as upright as possible. A lumbago rheumatica can give rise to lumbar scoliosis, if the rheumatism remain any length of time. Those scolioses depending upon muscle rheumatism are thus caused by a loss of equilibrium between the corresponding antagonistic muscles that influence the spine. An early and very energetic treatment is necessary to check these forms of scoliosis, for if the patient be not completely cured within a few weeks after the appearance of the illness, the scoliosis may be stationary, and it even increases if a relapse of rheumatism occur; this especially holds good for torticollis rheumatica.

That *hereditary disposition* is of fairly great importance as regards the origin of the habitual scoliosis is clear from

Eulenburg's statistics, according to which an inherited tendency has been proved in 25 %. I have sometimes seen exactly the same form of scoliosis occur in three generations of women. In such cases prophylactic measures ought to be taken at an early period, the best being Gymnastics.

Examination of spinal curvatures.

The statement often appears in medical literature that an incipient scoliosis is difficult to detect, an opinion in which I cannot acquiesce. If one accustom oneself to often examine the normally developed spine, incipient deformities can easily be detected; but practice is presupposed here as in everything else. The examination of the spine in the growing generation ought to take place frequently, at least every third month, and ought to be done by everyone who has the care of children, for it is rather easy to see if the spine be straight when everything is all right and no measures need be taken. If, however, the very slightest curvature be found to the one or other side, the physician should be consulted. The examinations should always be made with the back bare; that even quite inconsiderable curvatures can be discovered through the clothes, is seen from the fact, that it often falls to the lot of dress-makers to discover an incipient spinal curvature. This circumstance, however, forms no reason why the examination of the naked back should be excluded, for then the curvature will be discovered far sooner.

On examination the physician sets to work so that he seats himself behind the patient who is to be examined. The latter remains standing and turned so that the physician has a good light from behind—best, full day-light; the skirts are fastened with a strap round the hips; the trunk is completely bared, only a light rug or shawl fastened round the neck, so that the back in all its extent is left quite free from clothes

and the arms can hang down freely (compare fig. 88). Plaits should be fastened up. The patient to be examined places the feet close together and moved forward equally, keeps the legs fully stretched in the knee- and hip-joints, and has also the gaze directed straight forward and the trunk turned straight forward, for, if any of these instructions be not observed, a curvature of the spine arises, which somewhat affects the examination.

It is also of importance that the patient who is to be examined should stand easily and quietly, without touching the examiner and without any order being given for the patient to stand straight, as incipient curvatures, in consequence of the exertion of the muscles brought into play, can then be effaced and remain unobserved.

After an upright standing position has been taken for a short time in this way, a slow bending forward is made; the arms must here fall freely downward-forward of their own weight, without any muscle contraction occurring.

By the patient's being examined both in an upright standing and in forward-bend position the most inconsiderable deviations of the trunk to the one or other side are best observed. In an upright-standing position incipient spinal curvatures are best discovered by the relations of the freely hanging arms to the side-contours of the trunk. If, for example, there be an inconsiderable displacement of the upper part of the trunk to the right—thus an incipient right convex dorsal scoliosis—the right arm hangs freely in the air, separated one or two ctm. from the right iliac crest, while the left arm lies close to the left iliac crest (see Fig. 86). In an incipient primary left-convex lumbar scoliosis the trunk will be displaced to the left and the relative positions of the arms will be reversed, that is, the left arm hangs freely and separated from the left iliac crest, while the right arm lies close to the right iliac crest.

Quite an inconsiderable asymmetry in both the lateral halves of the trunk is thus the reason that the distance of the freely hanging arms from the trunk is different; a difference also arises in the space that is formed between the arm and

corresponding side of the trunk (compare Fig. 89). This space has been called "*trunk-spatium*"; because of the difference of this on the two sides of the trunk, an incipient scoliosis can be discovered, even when that line which unites the spinous processes may be perfectly straight.

In forward-bend position the most inconsiderable lateral curvatures also appear, partly, and in the first place, as a bulging-out of the one lateral contour of the trunk and a corresponding flattening of the other, partly through the appearance of a slight arch in the line of the spinous processes. The examiner ought not to omit looking at the patient's back from in front and from above, when forward-bend position is taken. In this manner incipient dorsal scolioses in particular are discovered by the bulging-out out of the ribs to the convex side.

The patient's hips are observed both in upright and forward-bend position. In a right-convex scoliosis the rounding of the right hip seems to be more even, the left hip, on the other hand, more protruding, and the left part of the trunk takes a more triangular form on account of this, whereas, on the contrary, the right part of the trunk becomes more elongated and half-moon shaped (see Fig. 89). The difference in the height of the hips is best discovered thus: the examiner lays his hands on the patient's iliac crest on both sides, while the patient with fully stretched legs takes both upright and forward-bend position. The existing difference in the height of the hips can be fairly exactly determined by something being placed under that heel which corresponds to the sunken hip.

To make sure whether the shortening lies in the leg or pelvis or in both together, a similar examination is made of the height of the hips, when the patient takes sitting position on a level seat. A greater difference in the height of the hips is very easily discovered in the above-mentioned manner, but even a difference of $\frac{1}{2}$ ctm. ought not to be left undetected by a careful examiner. Even a measuring of the legs, while the patient takes lying position on the level seat, will make evident any existing shortening of the one side.

The different height of the shoulder-blades and different distances from the spine are best observed while the patient takes an upright position. If the patient can take hanging position, the different degrees of mobility in the different parts of the spine can rather easily be judged; by pressure on the greatest convexity of the curvatures during the hanging position, the mobility of the chest is also determined.

The changes that attend torsion of the vertebræ have already been mentioned. It is clear that in the examination the attention ought to be fixed on the possible presence of a larger or smaller number of these changes, so that for this reason the patient is subjected to examination from all sides.

Measurement of spinal curvatures.

The examination previously described is enough for the diagnoses of the different forms of scoliosis, but it is, in many cases, necessary that the examination be completed by means of various measurements, especially in order to get a fixed expression for the development of the scoliosis. By repeated measurements an expression is also obtained for the improvement gained through the treatment given, or for a continued impairment.

In measuring spinal curvatures, attention must be paid, partly to the flexion of the spine itself by measuring the arch formed by the spinous processes, and partly to the curved lines that are formed by the lateral contours of the chest, and the changes in level caused in different parts of the chest in consequence of the torsion must also be measured.

A number of more or less complicated and expensive measuring apparatus have been constructed which all possess the quality of being incomplete. A fairly exact measurement can be made with very simple means; at least sufficiently exact for a diagnostic purpose.

With a simple *sounding line* the bendings of the spine can be measured, after each spinous process has been marked with a coloured pencil. The starting-point for the sounding line ought to be the spinous process of the seventh cervical vertebra (*vertebra prominens*) or the external occipital protuberance. With an ordinary centimeter scale the distance is measured from the sounding line to each spinous process or at least to each maximum point, besides which the points of interference are also noted.

Of the differences in level or bulging-out of the different parts of the chest, which have arisen through rotation, direct copies can be obtained, if a *lead rod* of about 1 ctm. in breadth and $\frac{1}{2}$ ctm. thick be laid on the chest. The leaden rod can easily be bent to follow the different curvatures which are afterwards easily transferred to paper. Measurements of the trunk can in this way be obtained in both longitudinal and transverse directions and also when the patient takes forward-bend position, a fact which is of great importance, because by this means an incipient torsion can be discovered.

With *calipers* the diameter of the chest can be measured.

From *photographs* the presence as well as the further development of spinal curvatures can be well judged; the different forms of the lateral contours of the chest and of the various parts of the trunk being clearly observable on photographs. Skiagrams or photographs, taken with the help of *Röntgen's* rays, will probably in time give the very best information respecting changes in the spine.

Plaster casts give better views of the scoliotic deformations of the chest than all the measuring apparatus.

Thus, with very simple means, sufficiently exact measurements can be obtained of those changes that attend a scoliosis; measurements that are quite sufficient for practical use, when it is a question of deciding whether the spinal curvature is becoming better or worse.

Amongst constructors of good *measuring apparatus* I can mention *J. Miculicz*, *W. Schulthess* and *G. Zander*. *Miculicz'*

measuring apparatus is the simplest and cheapest (see Fig. 89), but with it, however, one can measure the length of the spine, its deviations from the middle line, existing differences of level, different heights of the shoulder-blades, and different distances from the spine—that is, all that is necessary for practical use. As this apparatus is well known and the method



FIG. 89.

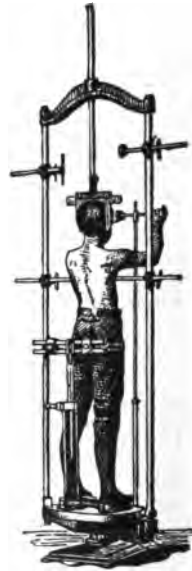


FIG. 90.

for its use is apparent in the illustration, a further description of it would be superfluous. The elastic steel-bars are marked with a millimeter scale, the transverse steel-bar is movable both upward-downward and laterally. The perpendicular bar can be bent so as to adjust itself to the pelvic disc, on which latter a perpendicular side-scale is fixed, showing the degree of torsion.

Schulthess' and *Zander's* measuring apparatus are, in many respects, more complete, but at the same time are much more expensive. Fig. 90 shows *Zander's* apparatus which, without doubt, is the best of all hitherto constructed and the only one fully suitable to scientific purposes.

The prognosis of spinal curvatures.

It has already been said that in any one given case it is impossible to foretell whether a scoliosis can be completely cured, whether it will be stationary in a certain stage, or whether it will be further developed, and, in this case, what degree of development it will attain. At the same time I express my own experience and that of many others, when I say that scoliosis once developed seldom retires of itself. I wish also to lay stress upon the fact that the greater part of scoliosis of the first degree, under suitable treatment, disappears altogether; that scoliosis of the second degree can at least be arrested at a comparatively low stage of development or even be essentially improved by treatment, but, as a rule, cannot be quite cured; and lastly that scoliosis of the third degree cannot be improved by treatment, but can only be symptomatically treated.

The forms of scoliosis which are reported as disappearing of themselves, are such as appear at an early period of life, i. e. before puberty, which affect a great part of the spine and do not form any short, sharp curvature, and which have also early become stationary, and thus, during the further growth of the patient and a constant development of strength, have gradually been effaced.

In order, however, to gain the very best results that can be obtained a scoliosis should be brought under treatment as early as possible. Different methods of treatment will be described later on. So much can, however, be said now, that the rachitic scoliosis first and foremost claims an early treatment, and when it appears, as has already been said, during the first years of life, the gymnastic treatment cannot well be

adopted, but one must be content to apply orthopedic apparatus. The gymnastic treatment cannot be used for lateral curvature with any real effect until the patient has reached an age of about 5 years.

The patient should always be told beforehand that the treatment may last for months or even years, and that it may be necessary to repeat it as soon as the slightest change for the worse is noted; great patience, therefore, is required both on the patient's side as well as on that of the physician or gymnast.

Anyone who has had occasion to observe and treat a great number of scoliotic patients, is careful enough not to promise too much from any treatment, no matter of what kind or number. The less experienced "promise much and do little"; physicians often say, that "scolioses grow away of themselves" and do not therefore require to be treated; gymnasts promise to "cure" every scoliosis with their treatment, even the incurable descriptions. The real fact of the matter is, that some forms of scoliosis, in spite of the very best treatment, both with Gymnastics and orthopedic apparatus, become worse during some periods; this specially applies to the rachitic scoliosis. As I had observed this circumstance in a few instances, and on one occasion spoke of it to my colleague, Dr. G. Zander, this very experienced and critical specialist gave me the consoling information that he too, had had to make the same disagreeable observation. The treatment in such cases need not be looked upon as being without result, although the scoliosis gets worse, because without treatment the condition would perhaps have been still less favourable.

In treatment of spondylitis it will often be seen how the hump is increased, in spite of the best treatment being given. *Lorenz* has very correctly said that the size of the hump corresponds with the process of the disease. A similar circumstance also holds good as concerns the development of the scoliosis, that the size of the curvature or curvatures corresponds with the degree of severity of the affection; this is certainly the case in rachitis.

As the prognosis for scoliosis can not generally be said to be good, one should take care that prophylactic measures be taken, and also that existing scoliosis be early discovered and treated. As concerns the prophylaxis, a careful attention to the child's sitting, standing and walking properly, not only at school but also at home, prevents the origin of many a scoliosis; it is therefore the duty both of the school and home to support each other here. According to my experience as a physician for schools and gymnastic institutes, there exists quite too great and unjustifiable a habit of blaming everything on the school. The fact is, the children, in most cases, are better looked after during work and have better arrangements for their health at school than at home. It is rather general in schools now that there are benches, tables and chairs, suited to the different sizes of the children; the proportion between the table, chair, back-support and stool, is at school the proper one, which seldom is the case at home, where children of different ages and sizes must generally sit on the same sort of chair, at the same table and, as a rule, without support under the feet. At school, also, the light is sufficient and it falls from the proper side, a precaution that is not observed at home.

A rather important prophylactic measure is also to see that children, and especially girls, do not sit too long at once, and that they do not do too much work. A very preposterous method of education exists amongst the richer classes, whereby girls, during their best period of growth and development, in addition to their school lessons, must also do fancy-work, piano-playing, painting, etc. They must, at the same time that they go to school, also attend to their preparation for confirmation, but when that is over they are generally free from every kind of occupation. That such a concentration of work during the years of growth has an injurious influence is, of course, only natural, and it is certainly one of the most important causes of the more frequent occurrence of scoliosis in girls than in boys.

Amongst prophylactic measures the observance of the

simplest hygienic measures can also be included, such as sufficient food, cleanliness, light, air, games in the open air and bodily exercise; if a scoliosis has already developed itself, the necessity for such measures will be still greater. As specially regards bodily movements, Pedagogical Gymnastics in Sweden has been considered to possess very great importance as a prophylactic measure when there is a question of the origin of scoliosis. *Hartelius* says: "I have never yet seen scoliosis appear when Gymnastics has been properly employed from early youth." This is, however, to quite over-rate the value of Gymnastics. I have, in a great number of cases, seen lateral curvatures develop in school-children who have properly and diligently taken part in the school-gymnastics; an observation that most of the physicians of any experience in this branch have had to make. This circumstance does not gainsay that Gymnastics is the best means to give a good bearing of the body and to powerfully develop the muscles, bones and joints, so that Gymnastics ought to be diligently practised by the growing generation. That scolioses do, in spite of this, develop themselves in young people who use Gymnastics, depends upon other causes which Gymnastics cannot counteract.

In Sweden, in conformity with school regulations, examinations are made three times a year, in September, January and May, by a specially paid school physician, in all higher schools, both for girls and boys. In this manner no scoliosis ought to escape being detected, and even this point alone is of some value; whether treatment is afterwards undergone or not, is more the business of the home than of the school.

The different frequency of forms of scoliosis.

According to older statistical reports, the habitual right-convex dorsal scoliosis was that most commonly occurring; according to reports of later date the habitual left-convex lumbar scoliosis is the commonest. I have looked through the

Journals of the Gymnastic Orthopedic Institute for a period of 10 years, 1886—1895, and found the following figures.

The total number of scolioses observed during this time was.....	1,191
Of these, C-formed numbered.....	669
and S-formed numbered.....	522
Of the C-formed, right-convex numbered.....	316
“ “ “ left-convex numbered.....	353
In respect to sex 974 of the patients were females, i. e. 81.78 %	
“ “ 217 “ “ male “ 18.22 %	

The great majority of the right-convex were dorsal scolioses, the left-convex lumbar scolioses.

The treatment of scoliosis.

The methods that are used in the treatment of scoliosis are four, namely, *the gymnastic, the mechanical, the anti-static and the operative*. The gymnastic and mechanical methods are very much allied to each other, which should be obvious from the description given here below of the different methods.

Everyone, undertaking the treatment of spinal curvatures, ought to be familiar with, and know how to apply, both the gymnastic, mechanical and anti-static methods, so as to be able to do his patient the most possible good, so that these two latter methods are briefly described here. On account of my possessing a rather extensive experience in this branch I dare assert, that the one who believes himself able in every case to gain everything by means of one only of these methods, does not properly understand spinal curvatures. Swedish gymnasts have almost, without exception, condemned the mechanical and anti-static methods, probably because they have never had instruction in the application of these methods and have thus not been able to see the use of them. They have considered the gymnastic method to be the only one necessary, and one quite sufficient, a natural consequence of the fact that they

have been given the opinion, that all scolioses depend on disturbed muscular activity.

It is true, that in a scoliosis of the first degree Gymnastics alone is sufficient, and is certainly the best means of completely checking the existing curvature, but even a mechanical recumbent apparatus or well arranged orthopedic corset can also check such a scoliosis; in an incipient lumbar scoliosis sometimes a simple antistatic means, in the form of a wedge in the shoe or a higher heel, is the only necessary treatment.

Even in a scoliosis of the second degree Gymnastics can alone be sufficient, but in several cases Gymnastics is strongly supported by an orthopedic apparatus, which helps to keep what has been gained by the daily gymnastic treatment in redression and correction of the scoliotic curvature of the spine.

The gymnastic treatment of scoliosis.

The Swedish Medical Gymnastic movements for spinal curvatures cause:

1) *the spine to be more mobile*, which is brought about by such positions being chosen and such movements being performed that are intended to correct a curvature or even over-correct it;

2) *the spine to be straightened and stretched*, which is brought about by means of tension and drawing of the spine;

3) *the deformities of the spine and chest to be checked*, which results when pressure is brought to bear on the deformed parts, while movements are performed;

4) *the physical constitution in its entirety* to be strengthened, by the muscles, bones and joints being more powerfully developed.

I cannot here help mentioning the strange circumstance, that a great number of foreign writers, especially Germans, blame the Swedish Gymnastic School for trying to correct

lateral curvatures exclusively by means of active muscle-movements, so that they very plainly assert that lateral curvatures cannot be cured by Swedish Gymnastics. Those who write in this strain have not understood the Swedish Gymnastic movements for lateral curvatures. In some movements no muscle-activity is brought into play in the spine or muscles of the trunk; in other movements the said activity of the muscles is certainly strongly taxed in order to redress or over-correct a lateral curvature, which cannot, under any circumstances, be injurious but rather useful. That a normal muscle activity, however, is of the greatest importance for the retention of the spine in an upright position, is fully proved from the fact that somewhat severe scolioses quickly develop themselves on those occasions, when the muscle antagonism from one or other cause is disturbed. Strongly developed muscles make it possible for the patient by his own strength to keep his spine in an upright position even during the time when he is not being treated.

Very good and rapid results can be obtained in scoliosis by means of sensible and well directed Gymnastics according to the Swedish method, whether the treatment be called manual or mechanical Gymnastics—for the principle of both is the same. None of the Swedish physicians who occupy themselves with this speciality, would care to treat scoliosis without Gymnastics, and it is much to be wondered at that prominent foreign specialist colleagues declare it to be worthless; they write blindly of the matter without having seen Swedish Gymnastics properly performed and thus without knowing what they blame.

The following *movements, which have a general effect*, are first employed; they are intended to strengthen the muscles and, at the same time, to straighten the spine, so that they can advantageously *be used for all forms of lateral curvatures*, partly as a change from other movements that have a purely special effect, and partly as home-movements, as they are easily learned and cannot well be performed incorrectly. The movements are here arranged (as later on, the “scoliosis-move-

ments" proper will be) so that the weakest are used first, coming by gradual increase to the strongest.

Double arm-heaving (page 87).

Hanging (pages 21 and 145, fig. 2).

Sitting spinal-raising (page 118, fig. 65).

Stretch-sitting holding with rod (page 142, fig. 82).

Stretch-standing knee-flexion and extension with wrist-support (page 96).

Sit-lying double arm-flexion (page 90, fig. 43).

Forward-lying double arm-flexion (page 90).

Stretch hanging neck-raising (pages 99 and 120).

Stretch forward-lying neck-raising (pages 100, 120 and 144, fig. 50).

Stretch hanging heaving (page 86, fig. 21).

The above-named movements are all properly described at the places mentioned. As specially regards hanging and heaving, the prophylactic importance of these movements is pointed out on page 87. If hanging cannot be taken many minutes at once, it can always be repeated often instead and it always does good. The spine is stretched by the weight of the body at the same time that the chest is expanded, provided that the holding of the apparatus, boom or trapeze, and the bodily bearing are perfectly correct, as described on page 21. Hanging heaving is still more beneficial than hanging alone.

A *boom* or *trapeze* can easily be made adjustable so that it has a more directly correcting influence on the lateral curvature. In a right-convex dorsal scoliosis, for example, that end of the apparatus which is to be held by the left hand, is placed a little higher and vice versa. If S-formed curvature exist

with right-convex dorsal scoliosis and left-convex lumbar scoliosis, the arrangement of the trapeze will be the same as in the above-mentioned case, but then by also moving the legs over to the left and fixing them in this position, correction is also made of the lumbar curvature.

Home-movements can, if industriously practised, support every treatment of scoliosis; they partly help to keep up what has been gained correctively through Gymnastics and they will also, when only orthopedic apparatus are used, counteract the injurious influence that these have on the muscles of the trunk.

Movements for C-scoliosis.

They are intended almost solely to correct the lateral curvature of the spine or even to carry it over in an opposite curvature, which is effected partly by the patient's taking a suitable position, partly by actively bending the spine over to the convex side, and by the gymnast's exercising pressure at the same time toward that part of the chest which corresponds with the maximum point of the curvature. In all these movements an increased stretching of the spine and an increased mobility are gained.

One point of somewhat great importance in the treatment of scoliosis by means of Gymnastics is, that the gymnast exercises the pressing in the right direction and that, as a consequence of this, the bending of the spine also is performed in a right direction. As has already been said, the pressure ought to take place on the maximum point of the curvature, but, at the same time, in the direction of the greatest diagonal diameter, in which direction the bending ought thus to take place; for example, in a right-convex dorsal scoliosis, in the diameter that passes obliquely forward from behind and from the right to the left.

This has never been previously pointed out in the literature that treats of Gymnastics, so that side-flexions have been

performed and for the most part are still performed directly to the side, and thus with the pressure applied in the same direction. If we keep to the example just mentioned, of right-convex dorsal scoliosis, then in this case a further pressing-in has taken place of the anterior extremities of the ribs on the right of the chest, which have before been pressed in, besides which an increased flexion has taken place of the posterior extremities of the ribs which are already quite too much bent. By such a method of procedure the deformities of the chest have been increased, whereas, on the other hand, by using the method spoken of by myself, it must be diminished or else be completely brought into shape again, if the chest be fully mobile.

Twisting can produce the same effect as flexion, although always in a rather weaker degree. The twisting is made toward the concave side of the scoliosis during simultaneous pressure on the maximum point of the curvature, as has been described above.

Movements for cervical scoliosis.

The best, and often the only movement that is necessary, is

crutch-standing head side-flexion (page 101, fig. 51).

Here again the movement ought to take place in a diagonal direction as the illustration shows. No other position fixes the trunk so well as this, which at the same time prevents an opposite curvature from arising or increasing while the movement proceeds. If one shoulder be lower than the other, it is placed in crutch-standing position, irrespective of the side to which the cervical scoliosis is directed.

Head-flexion backward in different positions (see page 99) and

Head-rolling (page 142) helps to increase the mobility in the region of the neck.

Head-twisting (fig. 71) ought also to be used, if the rotation exist in the spinal region of the neck.

Right-convex cervical scoliosis in a girl, 8 years old, treated 1896.

During the days just about Christmas 1895, she had rigors and slight fever, with pain and stiffness in movements in the neck, besides which the lymphatic glands on the left side of the neck were swollen. The complaint was thought, by the physician who attended her, to be rheumatism and it yielded to salicylic acid. The proper illness was thus completely checked, even the glandular swelling disappeared, but a somewhat considerable scoliosis in the cervical region of the spine had, during the time, formed itself, and as treatment with bandages, etc. gave no desired results, the child was sent for gymnastic treatment, 4/1 1896. A rapid improvement ensued and by 19/1 she finished the treatment, free from all symptoms of the affection; she had good and easy mobility of the neck and no pains. She is still well.

Movements for dorsal scoliosis.

We shall still take as our example a right-convex dorsal scoliosis with torsion in the spine and the deformities of the chest previously given and with the left shoulder lower than the right. In all movements the gymnast exercises pressure in the manner which has frequently been mentioned.

Left arm neck-firm high ride-sitting right side-flexion
(page 103, fig. 52).

Left arm neck-firm standing side-flexion at boom
(page 103, fig. 53).

The boom ought to take support against the maximum point of the curvature, when the movement is intended for scoliosis treatment; the right arm is then kept hanging freely, both in this and the preceding movement.

Side-suspension (page 145, fig. 83).

These three movements can serve as types for the treatment of a dorsal scoliosis and have therefore been first men-

tioned. The first-named movement can be tolerated by every patient from the commencement of the treatment; the two others are given in the degree that an increase is desired. In the two first movements the bending is performed actively. Side-suspension is, on the contrary, a strong passive bending of the spine; this movement was first given by *Lorenz*.

Left shoulder-lifting;¹

Stoop stride-sitting left arm-extension (compare page 91, fig. 44);

Leg-lean standing left arm-extension (page 91);

Leg forward-lying left arm-extension.

In all these movements the gymnast exercises resistance to the lifting of the arm or stretching of the arm simultaneously with pressure on the maximum point of the curvature. In this manner the lateral curvature is easily redressed or over-corrected. The explanation of the method by which these movements produce their effects is clear enough from the description given on page 323 of the origin of the habitual scoliosis.

Right-side against stretch-grasp-standing forward-drawing (page 111, fig. 59).

Left arm neck-firm, right arm hips-firm left leg side-lying holding (page 145, fig. 20).

Both these movements have a powerful effect on C-scoliosis. The last one should not be given until the patient can well tolerate other, lighter movements, for a fairly great development of strength is necessary for side-lying holding,

¹ **Shoulder-lifting** is used in treating lateral curvatures. In this movement the patient supports his one side against a pole or other firm object, the gymnast takes hold of the wrist of the patient's other hand and, in this way, exercises resistance to the lifting of the freely stretched arm, while, at the same time, making pressure on the patient's scoliosis.

The corresponding leg-movement is called **Hip-lifting** and is given in the position shown in fig. 58, only with this difference, that the gymnast stands or sits behind the patient and places resistance on the ankle in the lifting of the leg or hip.

which is thus an active muscle-movement in redressed position. During the pauses for rest the spine becomes passively redressed, which is also the case in the above-mentioned forward-drawing.

Left arm neck-firm right arm hips-firm ride-sitting twisting to left. The patient performs the twisting actively, while the gymnast, standing behind, exercises pressure on the maximum point of the curvature and thus also increases the twisting and straightens the spine.

Right-convex dorsal scoliosis in a boy, 14 years old, treated 1894—1895.

The patient had in early childhood suffered from rachitis, and the best evidence of it was a considerable bulging-out of the lower anterior part of the chest on the left side; the chest was otherwise flat; the constitution generally weak and with a slender osseous structure. The vertebral column showed a deviation of 16 millimeters in the middle of the dorsal region; the rotation inconsiderable, and there was good mobility in the spine. The patient preparing for the Naval College, could only sacrifice twenty minutes for gymnastics, but industriously practised home-movements, and consequently succeeded, after 4 months' treatment, in being accepted as without defect at the above-mentioned school.

Left-convex total scoliosis, left lumbo-dorso-cervical scoliosis + round back in a boy, 10 years old, treated 1893.

He had had rickets in his early childhood. The scoliosis had not been observed until the winter of 1892—1893. The curvature included the whole of the spine, and from the maximum point, which was situated at the 10th dorsal vertebra with 21 millimeters deviation, it slowly decreased upward and downward. The right shoulder 2 ctm. lower than the left; the left hip 1 ctm. lower than the right. There was very inconsiderable rotation in the spine, which in hanging position became perfectly straight.

A cork sole of 1 ctm. was put into the left shoe, by which the bearing was essentially improved. Gymnastics was given from 20/4 to 19/5, but had then to be interrupted, as the patient sustained an injury to his head. He returned for continued treatment from 8/10 to 23/12, when he "finished quite straight in the back, with the shoulders, hips and chest the same on both sides."

Cases similar to the one described often occur for treatment and give, within a few months, good results. I can almost say that if the deviation of the spine be under 20 millimeters, complete improvement can be gained by treatment; if the deviation be greater, too much should not be promised, for the considerable deformities that accompany such a curvature cannot always be removed.

Movements for dorso-cervical scoliosis.

The movements given for cervical scoliosis can all be advantageously used also for dorso-cervical scoliosis, besides several of those given under dorsal scoliosis, such as

Ride-sitting side-flexion and

Arm-extension with resistance, and also

Side-flexion at boom and

Side-suspension, the last-named, however, depending upon how far down in the dorsal region the scoliosis extends; side-suspension is most effectual for dorsal and lumbo-dorsal curvatures.

Movements for lumbar scoliosis.

Left-convex lumbar scoliosis is, as has been previously mentioned, most common.

Stretch leg-forward-lying side-flexion to left, (compare fig. 15 and page 105) and

Forward-lying double leg-carrying to left (compare fig. 55 and page 106) are the most effectual movements for lumbar scoliosis, as with these together, a strong flexion and strong redression of the rotation in the spine can be obtained.

Arms-lean standing left hip-lifting (page 348).

Right side-lying holding,

Left side-flexion at boom and

Left side-suspension may also be advantageously used.

Right arm forward, right leg backward stretch spring-sitting holding (compare fig. 18 and page 143) is a specially good and powerful holding-movement, which can be used to advantage for left-convex lumbar and lumbo-dorsal scoliosis; a somewhat great exertion of strength on the part of the patient is necessary for the proper performance of this movement, but a very considerable over-correction of the spinal curvature can be obtained by its means. The gymnast can here too increase the redression by the ordinary manner of exercising pressure.

Amongst foreign physicians who have fully seen the use of spring-sitting holdings in the treatment of scoliosis may be mentioned a Frenchman, *M. Lagrange* who, in his work¹ has included this movement as well as the one reproduced by me in fig. 18.

Left-convex lumbar scoliosis (+ right-convex dorsal scoliosis) in a girl, 16 years old, treated 1895 (fig. 88).

She is big and stoutly built, has applied herself diligently to her school-work and sewing, etc., but has not had gymnastics of any kind. At the commencement of the treatment the line of the spinous processes in the lumbar region shows a greatest deviation of 26 millimeters, and the dorsal region a deviation of 8 millimeters. In the lumbar curvature there is considerable rotation; the spine in its entirety is stiff and hard, so that the redressing movements to begin with were very painful to the patient, while at the same time the gymnast had difficulty in overcoming the stiffness. As the lumbar curvature, in this case, was the primary and consequently the principal one, the treatment was principally directed to it, in consequence of which it was reduced after 6 months' treatment to 15 millimeters' deviation, but could not be further decreased by continued treatment. The dorsal curvature had altogether disappeared; thus in this case an S-formed scoliosis had, by means of the treatment, been changed into a C-formed one, a circumstance that does not infrequently occur.

¹ La médication par l'exercice. Paris, 1894.

As mobility in the spine was increased by the treatment, it became necessary in this case, as in many others, to apply an orthopedic corset, which supported the gymnastic treatment, and also helped to retain the improvement gained, after the treatment had been concluded.

Movements for lumbo-dorsal scoliosis.

All the movements given for lumbar scoliosis may equally well be used for lumbo-dorsal scoliosis, as also can **the movements given for dorsal scoliosis**, of course properly observing the directions "left and right."

Out of this great number of movements a skilful gymnast ought to find it easy to choose the most beneficial movements for each special case; the choice here, quite as in the dorso-cervical scoliosis, depends upon the height and extent of the spine affected by the curvature.

Left-convex lumbo-dorsal scoliosis in a boy, 8 years old, treated from 1890 to 1895.

The patient was very big for his age, but had in general a weak osseous system; he had, besides the scoliosis, a long, narrow chest, and was somewhat round-backed and considerably knock-kneed. The scoliosis affected the greater part of the spine, and its greatest deviation, 16 millimeters, was situated in the upper lumbar region; an incipient torsion was found, but the spine was fully mobile. The right shoulder was 2 ctm. lower than the left. The lower part of the trunk was carried somewhat to the left, but the height of the hips was the same.

This case is instructive in this respect, that the scoliosis by means of the treatment could, in a short time, be repeatedly checked, to return again after a few months after the treatment ceased, which circumstance shows the necessity in some cases of a close succession of examinations and eventual treatment. Pedagogical gymnastics was constantly used.

During the winter 1890—1891 the patient was treated $4\frac{1}{2}$ months, after which the scoliosis disappeared all together; but it had returned by the autumn of 1891, although the deviation was now but 8 millimeters. Treatment was given in the winter of 1891—1892 for 4 months, in 1892—1893 for 3 months, chiefly with similar results. During the winter of 1893—1894 the treatment was only given 2 months, but even then with good results. During the greater part of 1894 there was no treatment, the

consequence of this being, that on examination of the scoliosis in January 1895 it had again reached the same extent as in the year 1890, or 15 millimeters deviation, with incipient torsion in the spine, the right shoulder 2 cm. lower than the left, and a somewhat considerable hog-back. Three months' energetic treatment checked these deformities almost entirely, the bodily bearing became good, the muscles were strengthened and the constitution altogether became powerfully developed. An examination of the spine in the beginning of 1898 showed a scarcely measurable deviation.

Movements for S-formed scoliosis.

As a typical Swedish gymnastic movement for the most commonly occurring S-form previously named, namely right-convex dorsal scoliosis and left-convex lumbar scoliosis with a sinking of the left shoulder (see fig. 87) can be given:

Left arm neck-firm, right arm hip-firm lean-standing raising with pressure (page 117, fig. 64).

What has been said before as to the manner for the application of the pressure in the C-formed scoliosis holds also good for the S-formed, so that the pressure in each curvature is applied in a diagonal direction on the maximum point of the curvature.

The above-mentioned movement is also performed in **ride-sitting** and **and stoop stride-sitting** positions (see page 117).

If the patient hold his arms in stretch-position, and the gymnast, standing in front of him, hold the patient's wrists and in this way help him to raise himself, the redression will be fairly powerful; the position named is used when the shoulders are pretty nearly level; if a somewhat considerable lowering of the left shoulder exist, only the left arm is held in stretch-position and the right in hip-firm.

Left arm neck-firm, right arm hip-firm leg-forward lying holding (compare fig. 19 and page 144) is a good and powerful movement for the scoliosis in question; as is also

Left arm forward, right leg backward stretch spring-sitting holding (fig. 18, page 143), in which a mobile scoliosis is easily corrected; after the patient has learned to properly perform this movement.

Several of the **movements given under dorsal and lumbar scoliosis** are used also for S-formed scoliosis, when the principal object is to influence the primary, or, in other words, the most considerable curvature.

Left-convex dorsal scoliosis + right-convex lumbo-dorsal scoliosis + left-convex lumbar scoliosis in a girl, 11 years old, treated 1890—1895.

She was slightly developed and generally delicate, had almost constantly a bad stomach, could not go to school, etc. The scoliosis was quite inconsiderable, so that during the first few years together with a few "crooked-movements" she had a generally strengthening treatment. From the New Year 1894 she constantly complained of a pain in her left side, under the hypochondrium, and her mother made the observation, that during sleep the child always lay crooked, with the left side doubled up. On examination she was tender to pressure on that part where she felt the pain, but no palpable changes could be detected; the splenic dullness was not greater, the urine showed nothing abnormal. The pain in the side was diminished by massage treatment. She received a gymnastic treatment for 4 to 5 months yearly, but the scoliosis gradually increased, mostly, however, during the intervals of the treatment. So, for example, the lumbo-dorsal scoliosis, which was the most considerable, in the spring of 1894 extended from the 7th dorsal vertebra to the 1st lumbar vertebra with a greatest deviation of 14 millimeters, but by the autumn of the same year extended from the 5th dorsal vertebra to the 3rd lumbar vertebra with greatest deviation of 17 millimetres, besides which the torsion had increased.

Compensatory curvatures up and down have never been considerable, the deviations have not exceeded 10 millimeters.

A corset, such as is shown in figs. 91—92, was put on, but on being repeatedly tried, has not been tolerated, in spite of its being well made and having been altered several times.

From 1895 the patient has become strongly developed, tolerated a more energetic gymnastic-treatment and, therefore, has essentially improved, so that the lumbo-dorsal scoliosis at the end of this year shows a deviation of only 12 millimeters, besides which the compensatory curvatures are so diminished that they can scarcely be measured.

Hog-back and round-back.

By *hog-back* is understood an increase of the physical curvature of the spine backwards; by *round-back* the deformity just mentioned together with an increase in the convexity of the back from side to side, so that the back is narrower than normally and, in forward-bend position with loosely hanging arms—as it appears best then—shows itself to be more or less round or semi-spherical. A few other deformities and anomalies in the bodily bearing attend hog-back and round-back, such as a flat and insunken chest, “hanging shoulders,” “forward-pushed neck,” forward-bent head, which in ordinary language all means a “bad-bearing.” Often the trunk, in its entirety, is somewhat bent forward, or else the hog-back is compensated by the patient's having a lordosis. In some cases the joints of the spine are slack and yielding, so that the bearing of the body gives the impression of its being “lanky”; in other cases the spine is more than usually stiff. Weakly developed muscles, general weakness and want of strength often attend this deformity, at least more frequently than is the case with scoliosis. But it is not seldom that scoliosis develops itself in children who have a generally bad deportment.

Hog-back and round-back in every case require to be treated as well as scoliosis, for left to themselves, they easily increase and the deportment will be ungraceful to a high degree. The treatment consists in bringing back the spine to its natural position and in strengthening the muscles at the same time, so that the patient can manage to keep his trunk and head upright.

Movements for hog-back and round-back.

Heave-sitting chest-expansion (page 84, fig. 41).

Double plane arm-carrying (page 107), in different positions, such as **back-lean-standing leg-lean-standing** (fig. 56) and **leg-forward-lying** (fig. 57).

Sit-lying rising (page 115, fig. 62), in different positions, such as **hips-firm**, **neck-firm** or **stretch**.

Stretch stoop stride-sitting raising with wrist-support and pressure in the back; in this movement the pressure is applied to the middle of the patient's back; such is also the case in the next movement, which by the position prevents an increase of a possibly existing lordosis.

Stretch (chest)-lean-standing backward-flexion with pressure in the back (compare page 102 and fig. 15).

Stretch-hanging heaving (see page 86 and fig. 21). To children and young people with weakly developed muscles it is necessary to give **leg-support** as shown by the figure.

As the movements most effectual for every different form of spinal curvature have been discussed, I consider it unnecessary here to give any gymnastic prescriptions; for a thoughtful gymnast, with the help of the principles given on page 156, can himself easily arrange the prescription required for each special case. I have also another reason for not giving a complete prescription for the treatment of scoliosis, and that is that experience has shown me that such prescriptions are often mis-used. Only few gymnasts have a competent knowledge of the causes, development and treatment of scoliosis. If they would only learn to understand this and consequently, when occasion requires, consult fully competent persons, much would be gained by this means. If Gymnastics be given for scoliosis, it must, as has already been said, be quite correctly used and with sufficient energy, but under no circumstances incorrectly or incompletely, as then the scoliosis will become worse and to a considerable degree.

Gymnastics for spondylitis ought *not* to come into question if the object therewith be to treat the disease itself, i. e. when

the process of inflammation is still continuing in the vertebræ. On the other hand Gymnastics can be used as an after-treatment, partly to cure the paralyses which may remain after spondylitis has run its course, and sometimes also to gain increased mobility in those parts of the spine not attacked by the process of the disease.

Stiffness in the cervical region of the spine, after an attack of spondylitis, in a boy, 10 years old, who was treated in the year 1889 by Professor *R. Murray*.

Spondylitis in some of the cervical vertebræ had arisen when the patient was 3 years old, and was completely healed after two years, but leaving behind it stiffness in the cervical region and upper thoracic region. A considerably increased mobility was the result gained by a gymnastic treatment, of course not between those vertebræ which were united in consequence of the inflammation, but between those lying above and below these.

Although the result gained in this case was good, and this treatment may thus seem to urge others to follow it in suitable cases, I consider, however, that very great care should be exercised in adopting it and that such treatment ought to be performed by none other than a physician. Such a warning is necessary, for Swedish gymnasts often make the mistake that, in acute spondylitis, they give Massage and Gymnastics directly on, or in the vicinity of the seat of the inflammation, a treatment which is, in every case, censurable.

The mechanical treatment of scoliosis.

Orthopedic apparatus.

The gymnastic treatment here in Sweden has for a long series of years been considered the best and the only one necessary for scoliosis, so that most gymnasts, even those medically educated, have given their advice against the use of every other treatment. Thus, for example, *Hartelius* tries to

prove the uselessness of orthopedic apparatus, and says that "the orthopedic method has not gained any success in our country," which utterance only shows ignorance as to the real state of the case. If Gymnastics has been so over estimated in Sweden, it has, on the other hand, been quite too long under-estimated abroad, but the opinion is gradually beginning to be formed that gymnastic treatment is as good as any other. At the Gymnastic Orthopedic Institute, orthopedic recumbent apparatus as well as a gymnastic treatment have been used ever since the "seventies," from which time the portable mechanical apparatus has somewhat taken the place of the extension bed. During the last few years we have quite done away with apparatus furnished with elastic pelottes, springs, etc., such as were formerly pretty much used in the treatment of scoliosis. Only in one single form of corset do we now use the elastic strap, namely in a cloth corset with steel splints sewn in. As I consider that gymnasts ought to have a little knowledge of the purely mechanical treatment of scoliosis, I here give a short description and two illustrations of this form of corset.

This *scoliosis-corset* is made in the following manner. A plaster cast is taken of the patient, who is suspended in the usual manner in *Sayres* apparatus and with the torsion as far as possible redressed. Over this plaster-torso the necessary splints are formed, by which means they can be extremely exactly made to follow the different flexions and deformities of the body. The splints consist of, first, a lower arch-like 4—5 ctm. broad splint which is supported round the hips above the trochanters, but below the iliac crest. This splint can either go all round the pelvis, and be fastened in front, or else can end at the anterior superior iliac spines. An upper arch-like splint goes straight across the back a little higher than the arm-pit, bends to the sides down under this and forms on both sides a crutch-like arch, which ends in front of the anterior arm-pit. These arch-like splints are united by means of 4 perpendicular splints, one on each side of the spine and one in the middle axillary-line. As all these splints are

formed from plaster-casts and put together over the same, and are besides tried on the patient, a firm supporting-apparatus results, which, at the same time that it follows the contour of the body, can support the trunk by its own firm support over the hips. This supporting-apparatus is afterwards covered over, so that to all appearance it resembles a cloth-corset; thus on the front-side of the trunk it consists only of cloth, so that the pressure unelastic corsets always exercise, to a certain degree, on the anterior surface of the chest, is here avoided (figs. 91 and 92).

After the corset has thus been made, elastic straps are ad-



FIG. 91.



FIG. 92.

justed, which exercise an even and steady pressure on the scoli-otic curvatures. If, for example, the patient who is to be treated has a right-convex dorsal scoliosis, a strong elastic strap is fastened on the inside of the right perpendicular axillary-splint, from whence it runs freely out through the hole between the two back-splints, where the elastic-strap is changed for a leather-strap which lies outside the left of these splints and runs further on, on the outer side of the corset, forward to the left axillary-splint where it is fastened. If the patient should have a left-convex lumbar scoliosis, a corresponding strap is placed which starts from the left axillary-splint and so on, in an opposite direction to that previously described. For

S-formed curvatures, 2 straps are used in the manner described above. When the corset is put on, it is fastened and laced independently of the elastic straps, which are first afterwards drawn and buttoned, by which means a rather strong and evenly divided pressure is obtained over the whole of the scoliotic bulged-out part. In order to influence a scoliotic spine by orthopedic apparatus, the pressure must act directly on the ribs, and in the apparatus here described the pressure is applied directly on the more or less developed rib hump; the pressure is further exercised absolutely correctly in the diagonal diameter, in the direction from the right, posteriorly, to the left, anteriorly—if we still consider a right-convex dorsal scoliosis. Pressure-apparatus acts as a rule more powerfully on the dorsal than on lumbar curvatures. Another *scoliosis-corset*, which also has a very great influence on a scoliotic spine, is to be seen in the figs. 93 and 94. How this corset is made is very easy to understand with the help of the figures.

The inelastic corsets are also used under certain circumstances.

Gymnastics ought always to be given together with the bandage treatment in every case where it is possible, so that the best possible results may be obtained, for it has never yet been disproved that the muscles of the trunk have been weakened by wearing corsets, a circumstance that the Gymnastics counteracts and prevents; but in many cases, for some reason or other, it may be impossible to undertake Gymnastics, and it is perhaps just in such cases that the apparatus described is of the greatest importance. I have, in many cases, seen that a scoliosis has become stationary, that is, that the scoliosis has not become worse during the use of this apparatus—on the whole a satisfactory result—but in other cases I have also seen improvement when the corset has been used without any other simultaneous treatment. This has, however, been in incipient scoliosis, not fixed, but with complete mobility, so that the spine, in suspension in *Sayres'* apparatus, has become quite straight. A deviation of the spinal process of about 1 ctm. from the median line has thus totally disappeared, a circum-

stance which in some cases is of value. Too much confidence should not, however, be placed in any real corrective influence of the corsets with elastic pelottes and straps.

Gypsum-, poroplastic- or wooden-jackets (corsets) are more seldom used for scoliosis, for the reasons previously mentioned, that the muscles of the trunk must of necessity be weakened by wearing such corsets; this is especially the case



FIG. 93.



FIG. 94.

with the unelastic corsets. To use such for scoliosis which is already fixed, I consider to be a mistake, as no real correction is gained, and the use of the sheathing in which the patient is thus enlaced, does not, by any means, outweigh the many disadvantages that attend its employment. If one sees that a scoliosis is continually becoming worse in spite of treatment, an unyielding corset will, better than all other means, cause the scoliosis to at least become stationary, and the unyielding corset ought, under such circumstances to be given.

Every corset, of whatever kind it may be, should be so made that it can be taken off, so that the patient can properly keep the skin clean. Poroplastic corsets possess the advantage that they can so easily be re-formed. All unyielding corsets have one objection, that, during the summer months, they become altogether too warm, and on this account cannot be tolerated.

In several cases I have observed in elderly patients (generally in women between 60 and 70 years of age) that intercostal neuralgia, back-ache, want of breath, with several other symptoms, have appeared, after they have been free from them for several years, or ever since the time that the kyphoscoliosis developed in their youth had become fixed. An orthopedic corset is, when a change for the worse takes place, the best remedy; if Gymnastics be simultaneously given it will help to prevent the symptoms mentioned, but cannot influence the spinal curvature.

In order that the best apparatus may be obtained, the choice of them ought to be left in the hands of a physician competent in orthopedic treatment, as every practitioner is not at home in this specialty. The physician generally leaves the decision of the apparatus to an instrument maker, but for this there is no ground, as these people do not understand the nature or degree of an affection. It not infrequently happens that when an instrument maker has put on an attractive corset he considers that he has done all that is required; the patient and his relations may live under the false idea that all is well and properly arranged, and that no further measures are necessary, while all the time the patient's spinal curvature is increasing. Instrument makers also commit this mistake, but they put on apparatus where such are unnecessary or where they can be of no use; a mistake is sometimes made between scoliosis and round-back on the one hand, and spondylitis on the other, from which lamentable consequences can result.

Gymnasts should also always be on their guard to prevent such a mistake from arising.

The antistatic treatment of scoliosis.

The antistatic treatment exclusively, is used for lumbar scoliosis or sacro-lumbar scoliosis, when the disease is not far advanced, and the spine still has mobility. The forms of scoliosis mentioned always occur, as has already been said, when, from some cause or other, one leg or one half of the pelvis is shorter than the other. Under such circumstances correction should be obtained by the lower side being lifted to an exact level with the other. In a shortening of the leg, this is gained by *putting a wedge in the shoe or by the heel itself being made higher*. If the difference lies in the pelvis, it is necessary, besides putting the wedge in the shoe, to use a so-called *seat-cushion*. This is fast-sewn in the clothes, so that the patient when in a sitting position, will thus sit with the lower half of the pelvis on the cushion. By the two methods of procedure mentioned, complete equilibrium, as well in a standing as in a sitting position will be obtained, and merely by this simple treatment a scoliosis can disappear, which, left to itself, might have innumerable injurious consequences.

Some Swedish gymnasts consider themselves able to cure everything and also the deformity in question, by means of the only remedy that is at their disposal, viz., Gymnastics. They have therefore condemned the antistatic method, which, in its mechanical theory is so simple, that every one ought to be able to understand it. It has therefore not infrequently happened, that when the patient has been treated at the Gymnastic Orthopedic Institute with the simple antistatic means just mentioned, and has afterwards been treated by gymnasts, these latter have taken away the wedge and seat-cushion with the usual explanation "that if the one extremity be shorter and weaker, it will be strengthened by means of Gymnastics so that it will become as well developed as the other."

The antistatic treatment ought also to be used for the not infrequently occurring form of crooked bodily-bearing previously mentioned, when the pelvis and lower part of the trunk are kept carried to one side, although by measuring it can be

shown that both the halves of the body are perfectly alike. In this state no real scoliosis can be said to exist, provided that is, that the position has not become fixed, but the patient can, with the help of his voluntary muscles, take a normal or almost normal bodily bearing. If the patient carry his pelvis and trunk over to the left for example, the left leg ought for a time to be heightened, so that complete correction or even slight over-correction occurs. If the incorrect bodily position has only depended on what is generally called, "bad deportment," the wedge used can be taken away after some few weeks or months.

From the above-mentioned manner of procedure, viz., the placing of something beneath the one tuber ischii to obtain full equilibrium, the so-called "*crooked-sitting-method*" in the treatment of scoliosis has developed. In this, the patient must sit on a sloping plane with the "sunk" hip so much higher, that not only correction but also over-correction takes place.

The "oblique sitting" method was discovered by *Bouvier* and has been later on recommended by *Volkmann* and *Zander*. *Busch*¹ amongst other things says about it that the heightening of the left half of the pelvis must exercise a favourable influence on the position of the lumbar region, and that the patient, during the oblique sitting, must be carefully watched by his relations, so that the bodily bearing may be correct.

The operative treatment of scoliosis was introduced by *Gutrin* in the year 1838, and was founded on his previously mentioned assumption of contracture in the muscles lying on the concavity of the scoliosis. Sub-cutaneous vertical incisions were made in muscles and sinews, sometimes as many as 20 on one and the same patient. This method of treatment was discontinued after a few years, *Malgaigne* having proved that the patients operated upon became worse.

¹ Allgemeine Orthopädie, Gymnastik u. Massage. Leipzig, 1882.

In certain cases, however, as *Busch* says, the operative treatment is justified, such as for example, when after traumatic injuries or suppuration in the soft parts of the one side, cicatrization arises which bends the spine to the side. In one case of severe lumbar scoliosis, depending on a shortening of the sacro-lumbalis muscle through cicatrization, *Volkmann* has, in a very short time, gained a rapid and excellent result by means of sub-cutaneously cutting through the cicatricial tissues and following with orthopedic treatment. It is clear that no other treatment can, in such a case, produce such good results. I have quoted the above in order to further prove to the gymnasts that Gymnastics, as little as any other remedy, can be considered as being the only justifiable treatment of scoliosis.

DIETETIC GYMNASTICS.

In connection with the accentuation of the importance of Gymnastics in constitutional affections it has also been said that it can be used without there existing any real disease. Medical gymnastics is used under the last-mentioned conditions principally for those persons who, from one cause or another, get too little bodily movement, such as, for instance, after long confinement to bed in slow convalescence, for weakly developed youth, for very old persons, and also for persons who, in the best years of their active life, are hindered from taking necessary exercise. The necessity and use of a gymnastic treatment, under the above-mentioned circumstances, ought to be fully clear from what has already been said when speaking of constitutional complaints, and it should also be clear that the Medical Gymnastics is to be preferred to the Pedagogical, from what has been said in connection with the description of chlorosis and anæmia.

As for what specially concerns weakly developed adolescents, a great number are annually sent for gymnastic treatment, and it is in this respect easy to be persuaded of the beneficial influence a sensibly arranged movement-cure brings with it.

Very often the observation will also be made that young people who have received gymnastic treatment for a spinal curvature or for some other local complaint, at the same time that they have had the real disease cured, have also gained a better appetite, strengthened muscles, and a stronger development in general, besides which headache, general listlessness

and weariness and other nervous symptoms have at the same time disappeared.

It has even been shown that when the general well-being has, in this manner, been improved, but interruptions in or a conclusion of the treatment for the local complaint have taken place, a change for the worse in the general well-being has also ensued, so that such patients have returned to enjoy the generally strengthening treatment for a longer period. Several persons, who are in their best years, and in full activity within special branches, visit our Gymnastic Institute, because they suffer from over-exertion, diminished capacity for work, or only because they never experience the feeling of real well-being or complete pleasure in life. Older persons, who have concluded the active business of their life and therefore have not sufficient physical work nor the necessary exercise, take Gymnastics to compensate for this loss.

In all the above-mentioned cases and for many others Medical gymnastic is of the greatest importance.

The prominent French physician, Doctor *Fernand Lagrange* has in his works, published after his visit to Stockholm in the autumn of 1890,¹ expressed himself very commendably and enthusiastically on Swedish Gymnastics. But when in both the works named he says that Gymnastic Institutes in Stockholm are "un prétexte à réunions et à causeries," this must really be looked upon as an expression of the well known French politeness, for amongst about 5,000 patients whom I have learned to know during their visits to the Gymnastic Institutes, I have never found any one who has gone there for pleasure's sake.

The Medical gymnastics has certainly no other attraction than its now fairly generally known and recognized health-bringing influence to the human constitution; but Gymnastics is and will remain however one of the best remedies of medi-

¹ La Gymnastique à Stockholm in "Revue des deux Mondes." Paris 1891.

La médication par l'exercice, Paris 1894.

cine, for it can cause a weakened circulation to be improved, a superficial respiration to be deeper and fuller; a disturbed digestion to be restored; paralysed, and weak muscles to become functionally capable; physical deformities to be checked, an over-excited muscle and nervous system to experience a soothing influence and finally, both weakly developed adolescence and old age worn-out with work, to gain an increased vitality.

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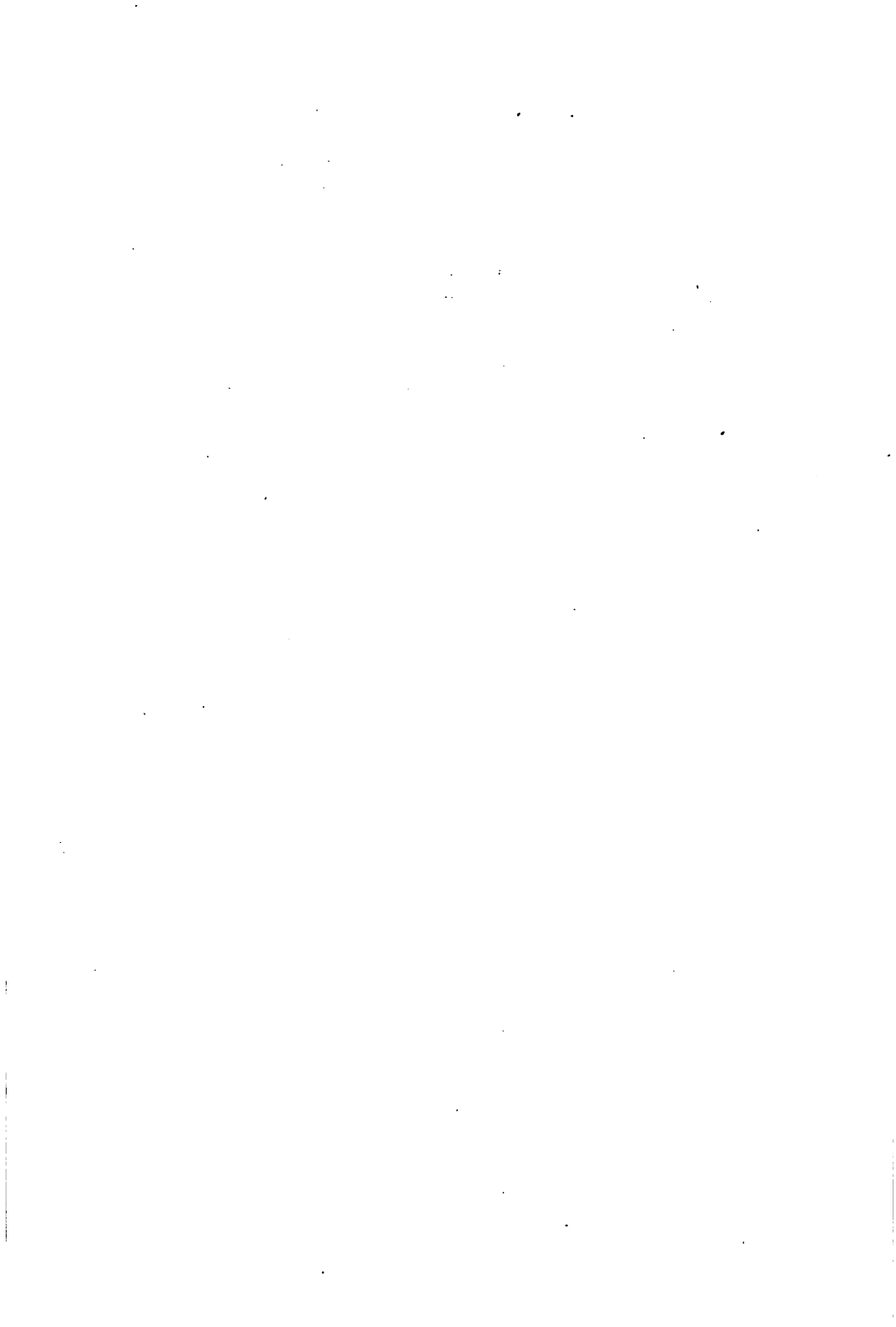
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